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MODERN PRACTICE

—OF—

CANNING MEATS

—BY—

G. T. HAMEL

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DEDICATED

to my good friend and first guide
in the food preserving industry

PROF. A. CORTHAY

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Introduction

Noted bacteriologists have recently published a few books on the preserving and canning industries, but such is the extent of the matter they deal with that not only the public in general, but even the packers and their foremen in charge, have very seldom gone through all the pages of those most valuable scientific works.

Moreover, these books, for one reason or another, pay very little consideration to the canning of the meats.

In the following pages I will try to explain what meat canning is, or ought to be, and I would like to make the great consuming public understand that canned meats, when properly packed up, are just as wholesome as any other article of food on the market.

I will also try to show that even small sized packing plants can derive profits from a canning department.

The consumption of canned foods is increasing all over the world. Their manufacture is now, or will soon be, everywhere under the inspection of skilled Government appointed inspectors.

My consideration of the scientific theory of preservation of food products in closed vessels, and also of the different materials used in the manufacture of the containers, may help them to exercise their delicate duty and fully protect the public health without unjustly injuring the interests of the packers, which are also well worth consideration as being part of the national wealth of the same rank as other large industries.

I am greatly indebted to the works of Professor E. W. Duckwall and Dr. J. Pacrette, which have been a great help to me in my canning experience, and I wish strongly to recommend their perusal to those wishing to go further into the matter of the preservation of food products.

Although this book is only intended to be a summary of the modern practice of canning meats in the large packing houses, I have not been able to resist the temptation of giving the recipes of a few products of higher class. My excuse will be found in the following lines copied from the book of Dr. J. Pacrette already mentioned:

"Now that the means of production are, we could say, unlimited, the competition is felt, the prices are lowered, and the packing industry alone remains a source of profit to the manufacturer who, by the quality of his goods, establishes the reputation of his brand. His goods are appreciated, and called for, because they have merits besides the brutal nourishing principles that all food products contain.

"Refinement of taste gains all social classes, palates are being more and more educated. The future belongs to the preserver who will keep up to date, to the canner who will be more anxious to increase the quality of his products than to increase his output."

G. T. HAMEL.

Ottawa (Canada). July, 1910.

Modern Practice of Canning Meats

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Chapter I.

Preservation of Food Products in Air-tight Receptacles

Summary of the Theory

The decomposition of meat is due to the action of small living organisms called *Bacteria*, *Bacilli*, or *Microbes*, which, after a certain lapse of time varying with their number but mainly with the surrounding circumstances, generate fermentation.

These organisms are found in the air, the water, the dust, on the tables of the canning room, the tools, and, in fact, everywhere, especially in the most remote corners where the cleaning is most difficult.

Their size is so small that 50,000 of them can pass, side by side, through a pin-hole made through a can, without touching the metal, and the canner must keep in mind that their power of reproduction is such that we can hardly have any idea of it, especially when they exist under favorable conditions.

Bacteria grow best at temperatures ranging from 70 to 100 degrees Fahrenheit.

I will not enumerate the different sorts of bacteria, nor examine their mode of reproduction, but I may say that most of those that the canner has to contend with reproduce by *spores*, a sort of seed, and that these spores are more hardy and resistant to destruction by heat than the living bacteria themselves.

In fact the only practical means for the canner to get rid of these ferments and to insure the keeping of his products is to kill the bacteria and their spores by the action of heat, and this process is called "sterilization."

Most of the adult ferments are killed by a temperature of 170 degrees Fahr., while some others require the boiling point, *i. e.*, 212 degrees, for 15 minutes at least.

The spores are very resistant to the action of heat, and it may be said that some of them require a temperature of 250 degrees for 30 minutes in order to be destroyed.

Cold does not destroy them, nor does pressure seem to have much effect on them.

The aim of the packer is to destroy the ferments contained in the meat and then to protect meats thus sterilized from the contamination of new ferments.

In practice, the packer puts the meat into suitable containers made of tin plate, glass, etc., and hermetically closes them, in order to prevent the introduction of new agents of fermentation, and then he will destroy, by the action of heat, all ferments contained in the air-tight receptacles.

We know that a temperature of 250 degrees Fahr. will destroy not only all living bacteria but also their spores, but the canner soon finds out that such a high temperature may be injurious to certain classes of products by over-cooking them and rendering them unpalatable or, at least, unattractive.

Fortunately, in most cases, the action of salt or sugar will be sufficient to prevent the development of spores, and, therefore, avoid the danger of fermentation from their own work, while the adults will be killed by the rather low temperature of the boiling point. The salt alone would have been insufficient to impede the disorganizing work of the latter.

However, I wish to impress at once upon the mind of the canner that although heat is of great

help in destroying the ferments it does not destroy the *toxins* or poisons that may have been developed in the food products previous to canning. Hence the necessity of canning only fresh, wholesome materials and also the danger of "*reprocessing leaks*," as will be explained later on.

Necessity of Keeping the Canning Department Scientifically Clean

Cleanliness is absolutely necessary in the canning department. By cleanliness we mean not only the washing and scrubbing of the central part of the floors and of all parts of the machines and materials, such as tables, which are within sight, but the thorough washing of all of them in every part and especially in the small remote corners which an occasional visitor would have no idea of inspecting.

These small remote corners are the favorite places chosen by bacteria for incubation and development and are frequently the cause of a good deal of trouble for the canner, who generally is at a loss to ascertain the cause.

"Prompt disposition shall be made of all trimmings and waste material which shall be sent immediately to the rendering tank. If the floors and machines are not kept clean by the liberal use of soap, hot water, and disinfectants, the harmful bacteria will soon be present in all parts of the building in such numbers as to produce chemical changes when least suspected," says Professor Duckwall.

We must not forget that the aim of the canner is for many reasons to use as short and low "*process*" as possible, and, in fact, the process given is very seldom that which theory would recommend for absolute de-

struction of all bacteria and spores which may attack a given material, and nevertheless the product keeps well. But it has been found in many cases of carelessly cleaned factories that, after a few years, or sometimes a few months, certain species of bacteria which had not been met with before suddenly grow and, suddenly also, a process which had always been considered reliable fails. As it is only after a certain time that the spoiling of the products may be detected, a considerable amount of goods and money is lost.

Preservatives

Preservatives are chemicals which have the power of delaying the growth of bacteria in food products. Their use may have been, to a certain extent, helpful in the manufacture of some articles, such as catsups and sauces which are not packed in hermetically sealed receptacles, but the canner ought to ignore them entirely as sterilization by heat is certainly not only sufficient but safer and cheaper.

Not very long ago it was a very frequent thing to meet canners who would freely use borax, boracic acid, salicylic acid, etc., in the manufacture of the pickle in which the meats had to be cured. The proportion was indeed very small and it does not appear that it has ever caused any harm to the health of the consuming public. In fact human longevity has increased within the last 15 years, while the consumption of preserved goods has also increased in great proportions.

We must, however, give the highest approval to the legislation prohibiting the use of antiseptics in canned goods.

The packer who handles his meats in the proper way and at the proper temperature can take care of them without any trouble and without the aid of chemicals.

The use of saltpetre is generally allowed in small proportions, at least where it is customary to add it to the pickling elements.

In fact, the packer does not use saltpetre as an antiseptic but only to suit the fancy of consumers who desire a red color in all cured meats.

Chapter II.

Vacuum

The use of all antiseptics for the preservation of food products is now prohibited in nearly all countries, exception being made in regard to salt, sugar, vinegar and smoke, and also a small percentage of saltpetre.

In fact, chemicals are entirely unnecessary to the canner, and sterilization by heat is the only practical means to destroy bacteria.

Now, is there any advantage to the canner in creating a more or less perfect vacuum in the containers? To this question the bacteriologist answers: "No." The air-spaces which are left in the can being a good deal more easily penetrated by heat and, therefore, more easily brought to the proper sterilizing temperature than the solids or liquids which we have to preserve, the bacteria contained in such air-spaces will be destroyed sooner than those contained in any other part of the receptacle.

Therefore, in theory, it does not matter whether or not we create a vacuum in the receptacle, and the goods, when processed under similar conditions, will keep just as well whether the air has been expelled from the can or not.

Moreover, there is no machine which creates a perfect vacuum, and, therefore, the least particle of air left in the container would hold more than enough bacteria to start the decomposition of the product, and we must add that, even if it were possible to create a perfect vacuum, thus eliminating all bacteria carried with the air, this vacuum would not destroy the bacteria contained in the meats, broths, or jellies, and it has been proved that the absence of oxygen in the air is a great aid to the development of some of their species.

However, in practice the canner has an interest to create a certain amount of vacuum in the cans or jars, for the following reasons, viz.:

A. In the cans, to detect the leaky ones, and to compress the contents.

B. In the glass, to produce an air-tight sealing, by the mere fact of the atmospheric pressure on the lid.

But I repeat that all attempt to preserve food products with the aid only of a more or less perfect vacuum is entirely unscientific, and has already driven a few insufficiently informed packers to great financial losses.

The exhausting of the air contained in the cans after they have been filled with meat can be effected by different processes.

First. *Exhausting in a water bath, with the vent open.*

The trays filled with cans are dipped in a vat full of water, so that the water covers the tops of the cans by one or two inches. Owing to the small size of the vent hole (and if the temperature of the water is not colder than that of the cans) the water will not enter the inside of the can. The water is then brought to a boil by means of steam coils and its heat brings the contents of the can to a temperature near the boiling point, thus expelling nearly all the air, which bubbles through the vent hole. When the exhausting process is considered sufficient, the trays are raised and the vents are closed with a drop of solder at once, and before any chance has been given for the cans to cool.

Water-baths, as well as steam boxes provided with mechanical conveyers, have been built which are called "continuous exhausters," and they are extensively used in vegetable canneries where the time required for exhausting is short owing to the temperature and the nature of the materials.

Second. *Exhausting in a retort* with the vent open is, or, I should say, has been, extensively used in the meat canneries. To exhaust meat cans in water, when the contents have been allowed to cool and the jellies to solidify, requires quite a time. But the heat generated by the steam under pressure in the retort allows the canner to shorten the time required. He places the trays full of cans, with the vent holes left open, on the trucks of the retort and acts exactly as if he were going to "process," *i. e.*, he closes the door of the retort, turns on the steam and gets his soldering tools ready for tipping. When the time required has elapsed, he shuts off the steam, opens the door, and at once seals the vent holes of all the cans with a drop of solder. Then he pushes the trucks back into the retort, closes the door again and resumes the sterilizing process.

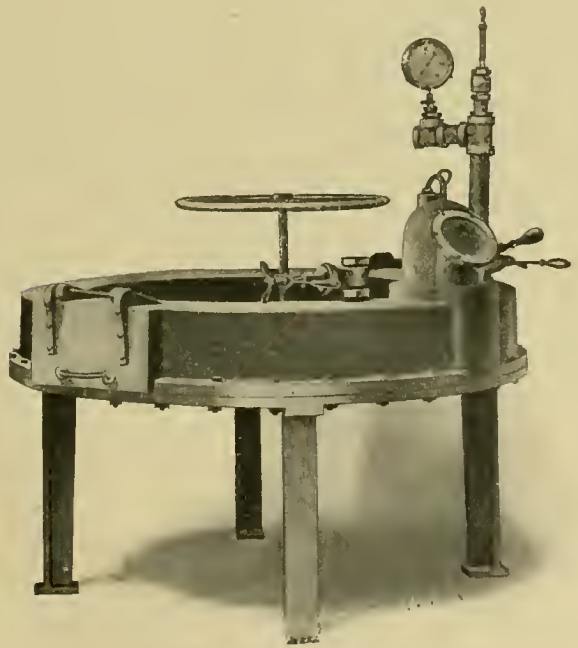
To one who has gone through the manipulation of all this boiling of hot materials, there is no need to say that the work is rather unpleasant.

Third. *Venting cans which have been previously sealed.* Still more disagreeable is the venting process, either under water or in the retort, which is sometimes employed for very large sizes, such as 14 lb.—Corned Beef for example. Here the cans are not only capped but "tipped" also previous to being placed either in the water-bath or in the retort. Then, after a certain time, as the pressure exerted by the boiling juices inside the can would put the can out of shape, if not burst the seams open, a man punches a small hole with an awl in the top of each can, from which hot air, steam, and also a quantity of boiling jelly escapes, perhaps scalding the man and swamping the floor. A second man following him closely immediately seals the hole with a drop of solder. And this disagreeable work is often repeated a second time, after an interval of an hour, before the definite process is resumed. Happily for the meat canner the vacuum tipping machine has done away with this old-fashioned method.

The Vacuum Tipping Machine

This machine allows the packer to get rid of the old-fashioned and uncleanly process of exhausting or venting the cans, either under water or in the steam retort, as I will explain in the chapter relating to "Corned Beef." Its introduction is of great value in the canning department.

The cans are run through the machine with the vent open. A vacuum is created in the chamber of the machine by a vacuum pump. All the cans have to pass under a glass covering which allows the operator to see them as they pass. He holds in the right hand the handle of a soldering iron which is heated by electricity and the point of which works inside the vacuum cham-



Vacuum Can Soldering Machine

ber. As the cans pass under the point of the iron the operator applies the point to the vent hole, which has been previously covered with a small drop of solder, and the can is thus hermetically sealed under a vacuum, most of the air contained inside the can having been exhausted by the action of the pump. The vacuum is released and the cans are taken out of the machine. They are received by an inspector and all of them which have not slightly "collapsed" under the influence of the vacuum are considered as "leaks" and returned to the patcher.

Some skill is required by the operator to properly "seal" the cans with this machine, but still more judgment is required by the canning foreman in order to make the operator do quick and neat work and at the same time to secure a good-looking, full can.

There must be just enough jelly put in the can to fill all the empty spaces between the can and the meat and all the empty spaces between the pieces of meat when the can has undergone the vacuum process and collapsed. But any excess will, under the influence of the vacuum and of the temperature, find its way through the vent holes and create trouble for the operator in the action of sealing the vent, as by removing the atmospheric pressure the ebullition of a liquid takes place at a relatively low temperature. The hotter the contents of the can the more tendency the jelly will have to boil and overflow under the vacuum. But, at the same time, if the operator has succeeded in perfectly sealing the vent, the can will collapse better when cold. The colder the contents of the cans are, the easier will be the work of the operator, but a greater degree of vacuum will be required in order to get the same collapsing of the can.

The above considerations concern canned meats only.

In the canning of fruits or vegetables the object of the vacuum process is rather to detect the leaks, even before the process, as there is no necessity of compressing the contents.

As the canning of so-called Pork and Beans is rather in the hands of the meat canners than in those of the vegetable canneries, I wish to say a few words about it. Pork and Beans are generally packed up in round cans of the shape and size called "packers." These cans are delivered by the can manufacturer with tops and bottoms convex. If the manufactured product shows a concave appearance at both ends it will be evidence of a vacuum existing inside the can, and, therefore, a perfect air-tight sealing. If the canner has given the goods a sufficient process he will be able to guarantee their keeping qualities under any climatic conditions. It is therefore an advantage to run the cans through the "vacuum pot" and under a light vacuum. But in the case of round cans of the type of 3 Lb. "Packers," which are made of rather light tin plate, attention must be paid and very little vacuum allowed in the machine. Otherwise, and especially when the contents of the cans are hot, not only the tops and bottoms would draw in, but even the cylindrical body of the can would collapse into a prismatic form, and have the appearance of a roughly smashed tin when it is entirely cold.

Needless to say the cans are run through the machine in an upright position, since the vent is on the top. However, the operator may have to handle cans which cannot stand upright inside the chamber of the machine on account of the height.

The writer has exhausted quite a number of 6 lb. Corned Beef cans in a machine made for 2 lb. cans. The vent hole was tipped, then a small hole punched in the body of the can at the highest point of the tin plate, when the can was lying on one side, and the can was run through the machine in that position and the hole sealed as usual. The results proved the correctness of the theory advanced to support this process.

Chapter III.

Canned Meats Containers

Cans Made of Tin-Plate

Tin cans are in general use for canned meats as being much cheaper than glass jars. They are also lighter and therefore save freight charges.

The trade has adopted sizes and shapes which the canner has generally to adopt unless he puts up high-grade fancy articles or new goods.

The thickness of the coating of tin on the iron plate which constitutes the tin-plate is a great factor in the price. But as this coating is the preserving agent against rust and, therefore, against the holes caused by it, the canner should not seek economy in the quality of the tin-plate. It is admitted that a tin-plate should be guaranteed by the manufacturer to average at least 3 lbs. of tin per box of tin-plate (14 by 20) in order to be fit for canning purposes.

The canner should also obtain from the can manufacturer a guarantee that the amount of leaks caused by defective soldering should not exceed a certain given quantity.

We are indebted to one of the most important tin can manufacturers in North America, the American Can Co., New York, for the following list showing what is considered standard size for staple articles.

List

Standard Meat Cans

		Diameter	Height	Opg.
¼ lb. Potted Meat Can,	Key	$2\frac{3}{8}''$	$1\frac{11}{16}''$	$1\frac{1}{8}''$
¼ lb. " " "	"	$2\frac{1}{2}''$	$1\frac{3}{4}''$	$1\frac{1}{8}''$
½ lb. " " "	"	$2\frac{15}{16}''$	$2\frac{3}{16}''$	$1\frac{1}{8}''$
½ lb. Vienna Saus. "	"	$2\frac{3}{4}''$	$2\frac{3}{16}''$	$1\frac{1}{2}''$
½ lb. " " "	"	$2\frac{15}{16}''$	$2\frac{9}{16}''$	$2\frac{1}{16}''$

Standard Meat Cans—Continued

			Diameter	Height	Opg.
1	lb. Vienna Saus. Can	Key	$2\frac{15}{16}$″	$4\frac{1}{2}$″	$2\frac{1}{16}$″
2	lb. " " "	"	$4\frac{1}{4}$″	$4\frac{1}{4}$″	$2\frac{11}{16}$″
1	lb. Flat Roast Beef Can	"	$4\frac{1}{4}$″	$2\frac{1}{8}$″	$2\frac{5}{16}$″
2	lb. Tall " " "	"	$4\frac{1}{4}$″	$4\frac{1}{4}$″	$2\frac{5}{16}$″
2	lb. Flat " " "	"	$5\frac{7}{16}$″	$2\frac{5}{8}$″	$2\frac{5}{16}$″
6	lb. Tall " " "	Plain	6″	$6\frac{1}{8}$″	$2\frac{11}{16}$″
1	lb. Lamb Tongue "	Key	$4\frac{1}{4}$″	$2\frac{3}{8}$″	$2\frac{1}{8}$″
½	lb. Lunch Tongue "	"	$3\frac{1}{2}$″	$1\frac{3}{4}$″	$2\frac{1}{8}$″
1	lb. " " "	"	$4\frac{1}{4}$″	$2\frac{3}{8}$″	$2\frac{11}{16}$″
6	lb. Flar. Lunch Tongue	Plain	Top. $6\frac{1}{4}$″	$6\frac{3}{4}$″	4″
			Bot. $5\frac{7}{16}$″		
$1\frac{1}{2}$	lb. Ox Tongue Can	Key	$5\frac{7}{16}$″	$2\frac{7}{16}$″	4″
$1\frac{3}{4}$	lb. " " "	"	$5\frac{7}{16}$″	$2\frac{5}{8}$″	4″
2	lb. " " "	"	$5\frac{7}{16}$″	$2\frac{13}{16}$″	4″
$2\frac{1}{4}$	lb. " " "	"	6″	$2\frac{13}{16}$″	4″
$2\frac{1}{2}$	lb. " " "	"	6″	3″	4″
$2\frac{3}{4}$	lb. " " "	"	6″	$3\frac{3}{16}$″	4″
3	lb. " " "	"	6″	$3\frac{5}{16}$″	4″
6	lb. " " "	Plain	6″	$6\frac{3}{8}$″	4″
½	lb. Hamburger "	Key	$3\frac{1}{2}$″	$1\frac{3}{4}$″	$1\frac{1}{2}$″
¼	lb. Chipped Beef "	"	$3\frac{3}{8}$″	$1\frac{3}{8}$″	Open
½	lb. " " "	"	$4\frac{1}{4}$″	$1\frac{1}{2}$″	"
1	lb. " " "	"	$4\frac{1}{4}$″	$2\frac{3}{8}$″	"
6	lb. " " "	Plain	7″	$5\frac{3}{4}$″	"
½	Pint Soup "	"	$2\frac{1}{2}$″	$3\frac{7}{16}$″	$1\frac{3}{8}$″
1	" " "	"	$2\frac{15}{16}$″	$4\frac{1}{2}$″	$2\frac{1}{16}$″
¼	lb. Flar. Cd. Bf. Hash Can	Key	Top. $2\frac{15}{16}$″	$1\frac{1}{2}$″	$2\frac{1}{8}$″
			Bot. $2\frac{1}{2}$″		
½	lb. " " " " "	"	Top. $3\frac{1}{2}$″	$1\frac{13}{16}$″	$2\frac{1}{8}$″
			Bot. $2\frac{15}{16}$″		
1	lb. " " " " "	"	Top. $4\frac{1}{4}$″	$2\frac{5}{16}$″	$2\frac{1}{8}$″
			Bot. $3\frac{9}{16}$″		
½	lb. Sq. " "	"	Top. $2\frac{5}{16}$x$3\frac{5}{16}$″	$2\frac{1}{4}$″	$1\frac{1}{2}$″
			Bot. 2x$3\frac{5}{16}$″		
1	lb. " " "	"	Top. $2\frac{7}{16}$x$3\frac{1}{8}$″	$3\frac{3}{4}$″	$1\frac{5}{8}$″
			Bot. 2x3″		
2	lb. " " "	"	Top. $2\frac{13}{16}$x$4\frac{5}{16}$″	$4\frac{11}{16}$″	$1\frac{13}{16}$″
			Bot. $2\frac{7}{16}$x$4\frac{1}{8}$″		
2	lb. (Net) Sq. Cd. Bf.	"	Top. $2\frac{3}{4}$x$4\frac{1}{2}$″	$5\frac{11}{16}$″	$1\frac{13}{16}$″
			Bot. $2\frac{3}{8}$x$4\frac{1}{8}$″		
6	lb. " " " "	Plain	Top. $4\frac{1}{16}$x$5\frac{5}{16}$″	$9\frac{1}{16}$″	$2\frac{5}{16}$″
			Bot. $3\frac{5}{8}$x$4\frac{7}{8}$″		
6	lb. " " " "	"	Top. $4\frac{1}{8}$x$5\frac{3}{8}$″	$8\frac{7}{8}$″	$2\frac{11}{16}$″
			Bot. $3\frac{11}{16}$x$5\frac{3}{8}$″		
14	lb. " " " "	"	Top. $4\frac{13}{16}$x$6\frac{3}{8}$″	$13\frac{3}{4}$″	$2\frac{7}{8}$″
			Bot. $4\frac{1}{4}$x$6\frac{1}{16}$″		

Standard Meat Cans—Continued

				Diameter	Height	Opg.
¼	lb. Veal Loaf	Can	Key	2x3 5/16″	1 3/16″	1 1/8″
½	lb. " "	"	"	3x4¼″	1 1/2″	1 1/2″
1	lb. " "	"	"	3 5/8x4 7/8″	2″	1 1/2″
½	lb. Bacon	"	"	3 1/16x5 3/8″	1 3/16″	Open
1	lb. "	"	"	3 1/16x5 3/8″	1 15/16″	"
12	lb. "	"	"	5 1/16x7 9/16″	12″	"
5	lb. Square Lard	"	Plain	5 1/8x5 1/8″	6 15/16″	1 13/16″
5	lb. Round "	"	"	6″	6 3/8″	1 13/16″

It is recommended by all hygienists that all seams be soldered outside the can to prevent contact between the contents of the can and the lead contained in the solder. Meats, however, do not attack the solder like fruits and vegetables containing acids.

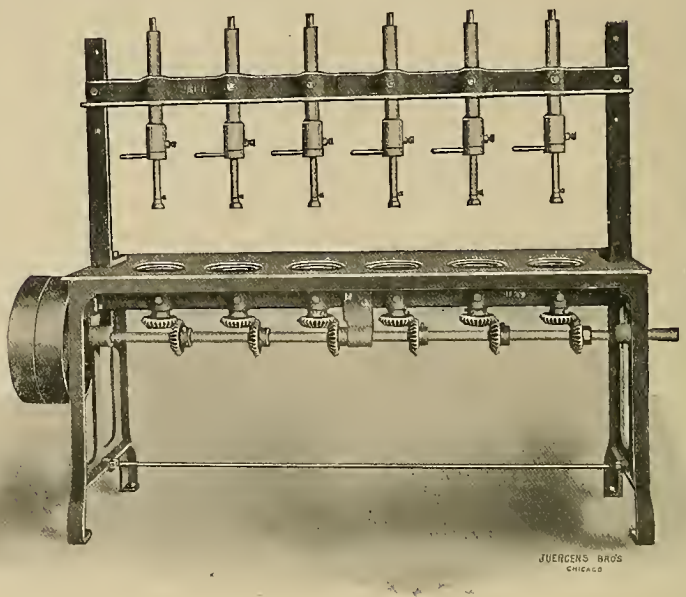
The use of chloride of zinc as soldering flux is also to be avoided. Up-to-date can-makers use only a solution of rosin in lard oil or, at least, a flux free from acids.

All cans are assumed to have been tested by the maker and to be strong and air-tight.

Washing Empty Cans. It is always proper for the canner to wash the inside of the cans before using them. This will clean out dust and dirt, and also the remainder of the soldering flux. The steaming of the can after washing will have the effect of sterilizing the can and also of helping it to dry out more quickly on account of the heat. When the amount of the business does not warrant the purchase of a special machine, any mechanic or steam-fitter can, at small expense, work out a scheme to obtain the desired result.

Standard cans have openings that are considered the best suitable to the class of meats to be packed in them. The smaller the opening is the less solder will

be required for capping, and this constitutes a great item in the price of canned goods.



Capping Machine. The capping of tins filled with meats is generally done by hand on the bench of the capping machine. In this machine the cans are placed on revolving stands while the caps are pressed tight against the tops of the cans by means of adjustable spindles. The helper of the capper does the placing and fluxing of the cap while the can is revolving, and the capper, working along the bench of the machine, holding in one hand the soldering iron and in the other hand the solder stick and "scratch-awl," seals the caps.

There are, of course, some automatic machines used by fruit and vegetable packers that may be utilized for meat capping; but they are very expensive, they require the help of skilled mechanics, and it takes quite a time to set them up whenever a change in the size of the cans is required. Unless the canning of meats is done on such a large scale that the machine

will run on the same size for a long time without resetting, this investment would not be advisable.

Soldering Flux. For capping, the use of a non-acid soldering flux is recommended; it meets the requirements of the pure food laws. One of the best fluxes I have used consists of 1 lb. of rosin melted over a slow fire with 1 gallon of pure lard oil.

Since the adoption of the vacuum tipping machine, the meat canner has done away with the old and inefficient system of detecting cap-leaks by immersion of the cans in a hot water bath. Any cap-leaks which may have escaped the attention of the inspector directly following the capping machine will be discovered after the sealing process under vacuum.

Vacuum Tipping Machine. The capped cans go to the vacuum sealer, vent open, and a drop of solder previously dipped into the soldering flux has been deposited right over the small vent-hole. When the machine is filled up with the cans the doors are closed and the machine chamber connected with a vacuum pump until the required degree of vacuum is obtained. Most of the air contained in the can is thus sucked through the vent-hole. Then, by a special mechanism, the cans are brought one after another under the point of a soldering iron heated by electricity, the solder drop is melted and the cans are then hermetically sealed. The man in charge releases the vacuum, and instantly all "non-leaky" cans collapse under the influence of the atmospheric pressure. All cans that do not show a concave appearance on the flat sides, or have not the tops and bottom *drawn*, are "leaks" and are returned for inspection. Once the weak point discovered, it is patched and sent to the vacuum pot again. A system now coming in vogue is the double-seamed can. Solder is not employed to seal the top to the body of the can. There is no opening in the top as it is double-seamed

on the body only after the can has been filled. Between the flange of the body and the top, and in order to make a perfectly air-tight joint, a special composition is applied which moulds itself under the pressure of the double-seaming machine, and has to resist the action of the heat in the retort, and later on the action of time, which is the worst of all.

This system presents a real economy of solder and of labor and is especially desirable for packers of articles which lose value when they are cut into pieces in order to go through the small openings of the cap; such as whole fruits, and, in the case of meats, a whole bird, chicken or game, tongue, etc.

This system is in fact the future of the tin can. But, whether or not a perfect cement, giving the same guarantee of permanent security as the solder, has been found, I can hardly say. However, many canners in Europe and also a few large firms in the United States are giving an extensive trial to this system.

Glass Container

Glass containers would be by all means the best packing for canned food of every description, as they do not alter the taste of the goods. But they cost too much, their weight is very great as compared with tin cans containing the same amount of meat,—which means high freight charges,—and their processing requires many precautions, as the glass, when hot and subjected to inside pressure, is very liable to crack if cooling is allowed to take place too quickly.

Consequently, whatever may be the difference in taste between the same goods when packed in tin or in glass, the canner has to put up with the tin can unless he manufactures high-grade articles. Otherwise the consumer would have to pay more for the container than for the contents.

Canners handling a local retail trade and who are able to redeem the glass jar from the consumer may succeed in creating a profitable trade in glass jars, as the quality of the goods will be readily appreciated.

Sliced bacon and sliced dried beef are extensively put up in glass jars by some large firms. The reason is that these goods, on account of their *curing*, *i. e.*, preservation by salt and sugar, can be kept in good condition for a reasonable length of time without being sterilized by heat. But creating a vacuum is advisable and will help in the keeping of the goods. In the case of glass jars the cured meat should be placed in the jar and the lid put on after a rubber has been inserted, which will, later on, make a perfectly air-tight joint. The whole is then run through the vacuum machine. When the vacuum is released the pressure of the atmosphere on the lid will compress the rubber between the lid and the glass and make an air-tight joint.

Other meat products, when put up in glass jars, must be processed in the same manner as tin cans.

Different classes of glass jars have been placed on the market. They generally belong to two different systems as far as the sealing is concerned.

In one class, one must rely upon the atmospheric pressure to keep the lid tight. In that case the jars would be processed under steam pressure in closed retorts. A special device, in the form of a removable spring made of steel band, is in a moment adapted to the lid. In the retort the contents of the jars are brought to the boiling point or over. When the process is completed the steam is shut off and allowed to escape from the retort. But the contents of the jar keep on boiling for a moment and, as the outside pressure is released, some steam escapes from the inside of the jar, carrying away most of the air contained in it.

Then, with the cooling of the jar, the boiling stops, the vapors condense, creating a vacuum, and the atmospheric pressure squeezes the lid tightly against the rubber ring. The rubber having been softened by the heat of the steam readily moulds itself between the glass and the lid.

However, I regret to say that experience has proved that sooner or later, and very likely on account of the alteration in the nature of the rubber ring due to the effect of time, the air will find its way through.

Therefore, these packages, although very convenient in many circumstances, do not offer absolute guarantee of long keeping.

In the second class the joint is pressed down tightly between the lid and the glass by a machine exerting a pressure of several hundred pounds per square inch. Then the same machine applies a metal ring which will maintain that pressure indefinitely after the action of the machine has been released. The goods are then processed. No vacuum exists, and we know that it has no influence on the keeping of the goods. An air space must be left between the top of the goods and the lid in order to provide for the expansion of the goods under the action of the heat in the retort or the water-bath. Otherwise the glass would crack.

In this system the joints are made of various substances, cork, rubber, cardboard, specially prepared paper, etc., according to the different materials to be packed, and a thin sheet of pure tin foil should be inserted between the contents of the jar and the joint, which prevents decomposition under the influence of the oil or acids.

It would seem that this last described system of closing glass jars, although it involves the purchase of a double-seaming machine, is by far the safest for long keeping.

Chapter IV.

Application of the Theory to the Meat Canning Industry

The operator being sure that the meats he intends to pack are wholesome, sound and in first-class condition, should "stuff" a given amount of meat into a tin or glass container, seal the container hermetically, and submit it to the required degree of temperature to insure the destruction of all ferments, thus insuring the good keeping of the contents for years and under any conditions as long as the receptacle remains air-tight. The canning of meats differs somewhat from that of liquids, such as soups; also from that of fruits and vegetables.

Fresh beef, for instance, holds about 40% of elemental moisture, most of which separates from the solid constituents under the action of the heat; as every cook knows.

Should the experimenting apprentice-canner fill a can with fresh beef as tightly as possible, seal it and "process" it, *i. e.*, submit it to the required degree of temperature to insure good keeping under all conditions of outside temperature, his surprise will be great upon opening it—for he will find a few small pieces, poor in color, swimming in the center of a soup of disagreeable appearance, in fact an unsightly product.

The appearance of the goods is a great factor in the sale of canned meats, as in that of every kind of food products.

Consequently, the meat-canner has had to discover some means to remedy this difficulty. There are several ways to overcome the trouble, which will be explained later on. But that simple little matter of the separation of fresh meat into solids and liquids under the action of heat is the only cause that makes the canning of meats so different from the canning of other food products, and that will always make canned meats have a different appearance from meats cooked in the kitchen range, although just as wholesome and nutritive when rationally prepared. Another point well worth consideration is the following: The liquids expelled from fresh meat by heat are not pure water. On the contrary they retain a great part of the nutritious elements of the meat.

When cooking the meat in a kitchen range it matters little, because, later on, these liquids are used for food in the form of broth, gravy, sauces, etc. The hotel chef is aware of this fact and saves all these valuable liquids to make his "stock" which is the base of nearly all his gravies or sauces. The modern meat-canner now does the same, saving, by concentrating, the above mentioned liquids, and selling the manufactured product under the name of *beef extract* or by any other name that may be suggested by the advertising manager.

It may be said that 100 lbs. weight of boned beef completely deprived of all soluble matter leaves 4% of dried extract. The commercial, so-called, "solid" extract still retains 20% of moisture, and the so-called "fluid" extract is made by the addition of 40 parts of water to 60 parts of solid extract.

The manufacture of these extracts will be given later on, and my present object is only to show the packer of canned meats the loss he sustains when send-

ing his "soak" and "cook" waters to the drain instead of converting them into a product which is at present worth $1.50 per pound.

If the "stock" of the hotel cook is the base of his sauces, the extract of the canning room is the base of most of the canned soups, as I will explain in due course.

Modern Practice in Large Meat Packing Plants

There is a considerable difference between the methods of preparing meats for the canning department employed in the large beef packing plants and those of small meat canneries preparing only fancy and high priced dishes.

We will describe the methods of the large canners only. Their aim has been to complete their packing house by the addition of a new department which may help them to sell part of their products under a different form. Having selected for this department, as well as for the others, the best scientific and mechanical means of work, they have succeeded in placing upon the market goods which are not only a wholesome article of food but, at the same time, are so cheap that no private house can afford to put up the same amount of meat at the same price, and thus they have become the great suppliers of armies, camps, mines, prospectors, sportsmen, etc.

The small meat-canner who is rather a preparer of high-grade articles, ready to serve dishes for consumers of fancy goods, does not need to be taught how to cook and season his goods, as he is generally a cook by trade and has competent assistance of that class. Nevertheless he may derive some profit from a perusal of the following pages.

I will treat, therefore, only of the manufacture of staple articles, as put up by the large packers, with the object of making my readers familiar with methods which should enable them to prepare an unlimited number of different products intended to suit consumers and the trade in every country.

In fact such large establishments as are found in the United States pack every kind of canned meat according to the requirements of the different nations they cater for and the specifications of their governments. They are prepared to give satisfaction to the Japanese or to the Mexican as well as to the European customers.

Curing of Meats

To "cure" meats, is to have them undergo a process, a treatment of salt and sugar, to which is sometimes added a small amount of saltpetre, which will modify the color, composition and flavor of the meat and greatly aid in its preservation under ordinary circumstances.

Curing also brings modifications, alterations in the natural state of the meat by adding or subtracting moisture, etc.

The addition of such harmless but in fact very powerful preservatives as salt and sugar allows the canner to process the meat without running it through an excessive degree of heat, as has been already explained in treating of the theory.

The alterations in the percentage of natural moisture has a great influence on the shrinkage of the meats after boiling and, therefore, on the yields of the meats used in the canning department. These considerations are sufficient to induce the canner to make a careful and complete study of the various curing processes. He will find them described in all publications

pertaining to the meat packing industry. Therefore my intention is not to describe them particularly but only to summarize their effects in connection with the canning department.

By curing the meats with dry salt and sugar, which is called *dry curing*, a certain percentage of their elemental moisture is absorbed by dissolution with the curing elements, salt and sugar, which surround them, and a corresponding shrinkage in the weight of the meat is observed. When boiling dry-salt meats, the shrinkage due to the cooking will be less than that observed in regard to the same meats cured in salt solutions.

On the contrary *sweet pickle meats*, *i. e.*, meats that have been cured by immersion in a solution of salt and sugar in water, will absorb a certain amount of the water of the solution and increase notably in weight. This increase is often from 10% to 15%. But, when boiling this meat, the shrinkage will be greater than that observed on dry-salt meats.

However, it is a fact proved by practical experience that, everything being considered from the start, sweet pickle meats give a better yield than dry-salt meats in the canning department. In all modern packing houses, the pickling of meats is now done in cellars where the temperature is maintained by artificial refrigeration at temperatures ranging from 36 to 40 degrees Fahr.

The higher the temperature is the quicker will be the action of the curing elements, but the pickle will also have more tendency to spoil and a more careful watching of the meats will be required. Personally I have, for a period of 6 years, cured corned beef in a cellar well protected against the sun but without any artificial refrigeration and I have obtained results which have surprised many packing-house men. But the over-

hauling was frequent and the man in charge was vigilant. Under such conditions the meat was sometimes cured very quickly, and it was an advantage in the case of rush orders.

The heavier a piece of meat, the longer the time required for the curing elements to penetrate to the very center of the piece, *i. e.*, the longer is the time required for fully curing the meat.

The foreman of the canning department when receiving the meat from the cellar should carefully examine it and assure himself that the meat is perfectly cured. He should cut two or three of the larger pieces right in the center. Fully cured meat will show an even color all through. Insufficiently cured pieces will be detected by the gray appearance of the center.

It is not very often that the packing house has so many orders for canned meats that it will be necessary to reduce the curing time. This has, however, happened in war times, and, in any case, the longer the meat is kept in the pickling cellar the more refrigeration will it require. Refrigeration is an item in general expenses. Moreover the interest on the money applied in the purchase of meat increases the output price, and, after all, the keeping of the meat is absolutely certain when in cans and cannot be considered quite as safe in the cellar.

Much has been said lately about shortening the time of curing the meat without "pumping" it. One of the devices is the following: The meat is placed in a metal box and is then covered with the pickle. A lid is applied to the box which fits so as to make a perfectly air-tight joint. Then the top of the box is connected with an air pump and a vacuum is created. All the air contained in the tissues of the meat is thus

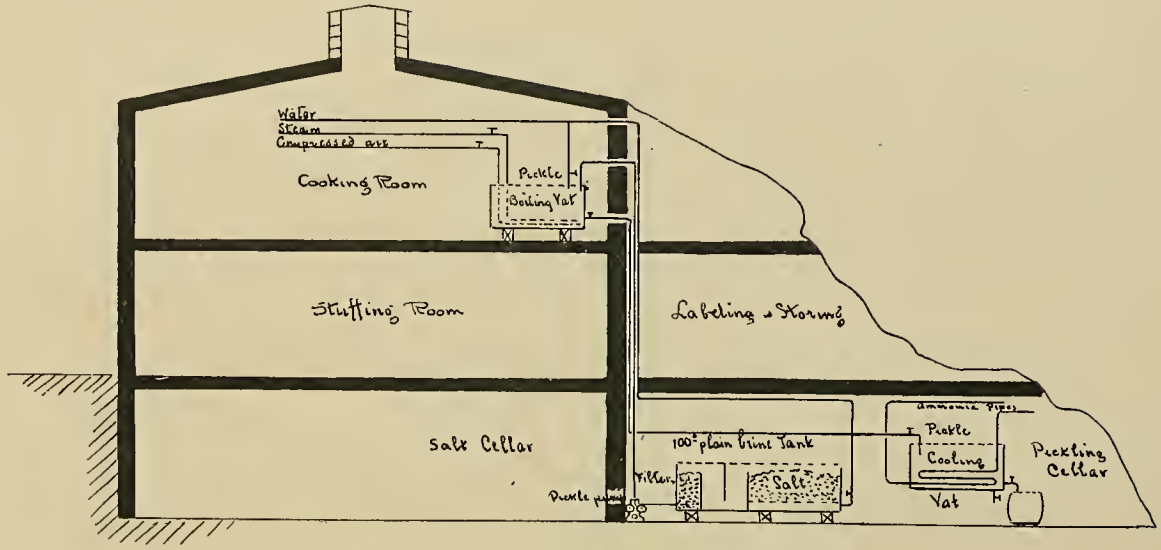
expelled, creating in the meat a kind of a porous state. Then the vacuum is released, the atmospheric pressure on the surface of the pickle forces it into the empty spaces, and, in order to hasten the process, an air pressure is applied to the surface of the pickle, as high as 100 lbs. to the square inch. A few minutes later the pressure is released, the lid raised off and the meat sent to the cellar. I have not yet had an opportunity of experimenting with the system, but it seems worth making a trial.

As already stated, I have not the intention of giving any pickling formulas or recipes for use in the pickling cellar. In fact, pickle used for curing beef for the canning department is made of 65 to 70 degrees strong plain salt pickle to which is added a proportion of about 35 lbs. of saltpetre for each 1,000 gallons. Sugar is also added, but here the packers differ widely, since one will only use 80 lbs. of sugar per 1,000 gallons while another will use 300 lbs. for the same quantity. The latter is the right one, not only because it produces a better quality, but also because the sugar serves as a kind of food for the meat and will greatly decrease the shrinkage in cooking.

The pickle should always be boiled and skimmed in order to get rid of all impurities contained in the water, salt and sugar, and to sterilize the whole mass, but it must not be applied to the meat until entirely cold. The sketch which I am giving shows a very convenient set of tanks for the preparation of the pickle when large quantities may be required at the same time for quickly cooling the same.

The small canner will boil his pickle in jacketed kettles and let it cool without artificial means.

(See tables of salt solutions in Appendix.)



Elevation Showing Curing Vats

Processing

To *process* is to submit a tin can or glass jar to a certain temperature and for the certain time necessary to insure that fermentation will be absolutely prevented in the contents as long as the receptacle is maintained perfectly air-tight.

Theory teaches us what temperatures are necessary to destroy all sources of fermentations, *i. e.*, to destroy the bacteria and their spores. In practice the canner has but very seldom to reach the theoretical point of sterilization, as he will be helped out by the presence of salt and sugar, which are harmless but powerful preservatives against the development of spores.

In most cases the aim is therefore to destroy the bacteria only.

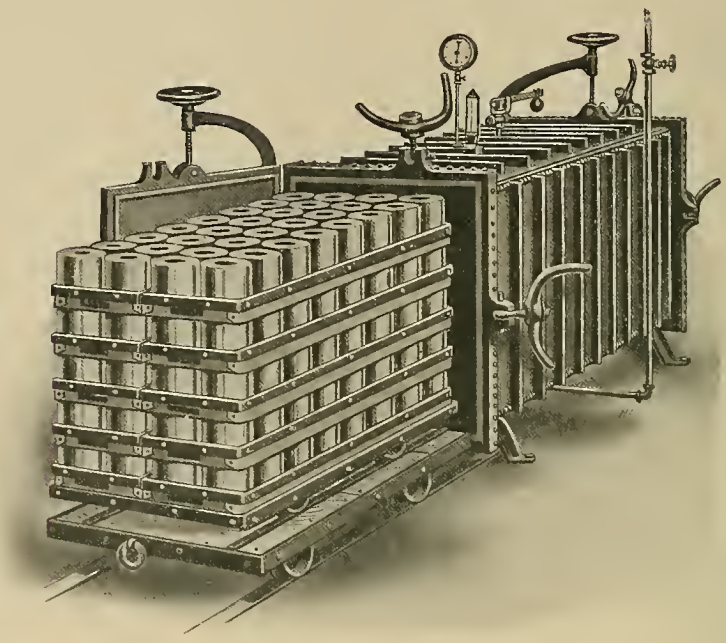
But in order that they may be totally destroyed the given temperature must reach the very center of the can, and, consequently, the larger the can, the longer the time required for the processing of the same class of goods.

The aim of the packer is to sterilize the product thoroughly, but, at the same time, to avoid overcooking, which would impair the quality of the product.

In order to ascertain whether the required temperature has reached the center of a certain sized can, the canner inserts a small self-registering thermometer (specially constructed for that purpose) in the center of a can filled with the material to be tested, seals the can as usual, puts a special mark on it, and, when the batch is out of the retort, opens it and reads the temperature obtained at the center of the can

Open Vat Process. Processing can be made in boiling water. Cans or jars should be immersed in cold water, the temperature of the water brought to the boiling point by means of steam, and the goods

kept in the boiling water for the required time. The time as indicated in the annexed tables starts from the moment the water begins to boil.



Horizontal Steam Retort

Steam Retort. Processing can also be made at a higher temperature than that of boiling point under steam pressure in closed retorts either in dry steam or in water. Retorts are placed vertically when processing under water is required, and horizontally for dry steam process.

Both systems have about the same practical effect on meats, although I have noticed in practice that long process in water has a better effect on the color of the meat and gives a more tender product than a quick dry steam process under high temperature.

Processing in Salt Solutions. By adding common salt in certain proportions to water, the boiling point

Upright Process Kettle

of the solution is raised. Chloride of calcium permits of reaching a still higher point and these two solutions are sometimes in use amongst the canners to process at a higher temperature than 212 degrees Fahr. in open vats.

Oil, which only boils at a very high temperature, has also been tried. These baths have, of course, to be heated by closed steam coils. However, after trial, the system has been abandoned by many of the large meat canning plants for some reason or another.

Cooling the Cans. When the meat has been sufficiently sterilized to insure its keeping, there is no further need to keep it cooking. In fact, all kinds of meats are always rather too much cooked after the necessary sterilizing process. The cooking continues for a time in cans going out very hot from the retort and piled tight, especially in big piles. For this reason

a good long sprinkling of cold water by some convenient device is to be recommended.

Cooling Glass Jars. Great care must be taken in the cooling of glass jars. Instructions are generally supplied by the glass manufacturers. As a general rule, the heating process, either in water or steam, must be very slow, and, in cooling, the rule as to a very gradual change of temperature must be even more strictly observed. Cold air drafts and the piling of glass jars on cold metal tables is generally the cause of a great percentage of cracks.

Testing Value of Sterilization. Incubators—Since we know that temperatures between 70 and 100 degrees are the most favorable for the growing of bacteria, in order to be sure that the product will keep under any climatic conditions, the canner should select a few cans from each batch and keep them for a few days in a closed receptacle similar to the hot-boxes called "incubators" by the bacteriologists. This should be a simple closet, with shelves made of slats, to insure the circulation of the air inside, and a steam coil should be placed along the bottom to keep a constant temperature of about 90 degrees.

If cans swell in the closet the process is insufficient. Doubtful cans may also be tried in this incubator.

Danger of Reprocessing Leaks

It must be first understood that I am speaking only of leaky cans that may be found defective after they have stood in the piles for several days.

The following remarks do not apply to leaks immediately discovered when the goods are passing out of the retort.

In order to be thoroughly understood by the reader, I think that I cannot do better than to repro-

duce the following lines extracted from the highly remarkable book of Professor E. W. Duckwall, on the "Canning of Food Products, with Bacteriological Technique":

"In order that packers may more fully understand the danger of putting out reprocessed leaks, let us look into the subject from various points of view:

"I.—There is danger of ptomaines forming in putrescible food.

"II.—There is danger of pathogenic molds and yeasts gaining entrance to acid foods.

"III.—There is danger of tin and lead poison.

"IV.—The quality is extremely poor and, therefore, detrimental to the packers' reputation.

"A *ptomaine* is a complex chemical compound formed in several ways, principally as a product elaborated by certain bacteria belonging to the putrefactive class. Ptomaine poisoning is much more common than generally known. . . . Usually in such cases the food does not by any peculiar taste or odor indicate the presence of an injurious substance. . . . The chemical changes are rapid and the ptomaines may be found when unperceived decomposition is taking place. . . . It is well known fact that tin and lead compounds are poisonous. . . . Canned goods which become swelled because of leaks have formed considerable acid and gas by the action of the bacteria and when worked over must contain tin and lead in appreciable amount. . . . Every can of goods you send out will probably reach a consumer who is looking for something good to eat; every package will either make a friend or an enemy for your brand. . . . Conclusion: Cut the leaks open, empty them and send the contents to the dump, or wash them away in the sewer."

Please remember that Dr. Duckwall has been a canner himself and is not only a noted bacteriologist but a practical man, and above all a friend to all canners. Therefore his advice must be considered as impartial.

Remarks

The boiling temperature of water at the same altitude being always the same, the canning foreman needs no instruments to watch it when he is processing goods under water.

But processing in closed steam retorts is a different proposition. The pressure in the steam generating boilers is liable to vary and, unless a special steam pressure reducing valve has been provided on the steam line just before the retort connections, a constant watch at the steam-gauge will be required.

Never use high pressure steam-gauges; use low pressure gauges.

Do not rely entirely upon the steam-gauge. It is liable to get out of order.

Your retort should be fitted not only with a reliable low pressure steam-gauge, but also with a first-class thermometer showing the actual temperature of the steam in the retort, and, by comparison, the pressure. This is, in fact, the only reliable instrument for the man in charge of the processing.

Cooling the Cans

When a sufficient "process" has been given to the canned goods to thoroughly sterilize the contents and thus insure perfect keeping the cans should be cooled immediately in order to stop the cooking process. If

the cans are piled while hot in the labeling room, those in the center of the pile will keep hot for many hours and this is liable to be detrimental to the quality of the product.

When cans have been processed in open vats under water the proper thing is to turn on the cold water until the cans are sufficiently cool.

The same may be said with regard to cans which have been processed in upright retorts.

When the cans have been processed in the horizontal steam-box, a very convenient device to cool them is as follows: The trucks are taken out of the retort and kept on the tracks. A system of perforated water pipes is hung from the ceiling and sprinkles water on top of the trucks like a shower bath.

When the cans are cool enough they must be cleaned of all the dirt and fatty matters which adhere to their surface. In the small plants this work is done by hand, and a convenient and economical method is to rub them vigorously in a box full of sawdust. In larger plants the cans pass through the "can washer." This is a machine where an endless conveyor carries the cans first through a hot-water bath, where lye or caustic soda has been previously dissolved, and then through a second bath or running water.

The clean cans are carried to the labeling room. It is customary to lacquer or paint meat cans, or at least the two ends which are not protected by the label. This prevents rusting of the tin plate. When the lacquer is dry the label is applied.

Hand labor is generally used in the lacquering and labeling room of the meat canning plants. The square shape of most cans prevents the use of painting and labeling machines which perform such cheap and neat work in fruit and vegetable canneries.

It is not advisable to label and box immediately. Whatever may be the skill of the inspector of leaks, there will always be a certain number of leaks which have not been detected, or which have been created during the sterilizing process. These leaks will become "swells" later on. They will develop naturally and show their defects if the cans are kept for a few days in a warm room. If you put your cans in boxes right away these swells will be detected only by the retailer and greatly injure your trade. I would advise the use of a special "waiting room," kept at a temperature of about 85 degrees Fahr., where the cans could be piled up and kept for a fortnight before boxing.

The last inspection is made by the boxing man, who should be reliable and vigilant. All cans which he is suspicious about should be put away for further examination by the foreman of the canning department, and, should some of them be doubtful on careful examination by the latter, they should be subjected to the test in the "incubator" before being considered as good for shipment.

Chapter V.

Recipes and Formulas

Corned Beef

Corned beef is generally received by the Canning Department all cured and ready to be cooked. The Canning Department has only to ascertain its quality.

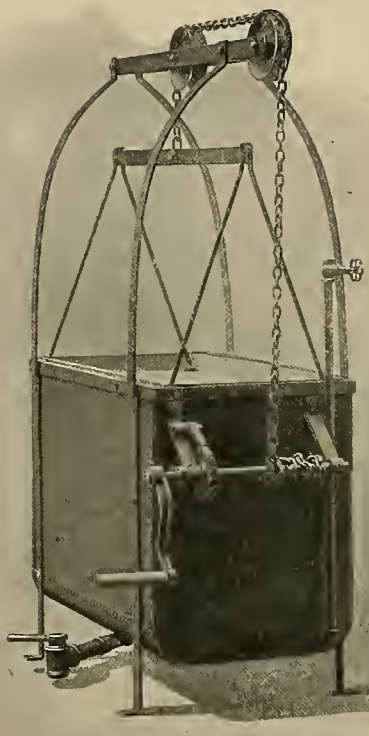
Corned beef is generally put up in square flaring cans called #1, #2, #6, #14. The 6s and the 14s must be net weight, *i. e.*, the contents when unpacked must weigh 6 lbs. and 14 lbs. net. The trade requires for all of them, but especially for the 6s and 14s, that the contents when unpacked under a reasonably cool temperature form a solid block easily sliced on the counter of the retailer. The meat must be well trimmed, free from sinews, gristle and skirtings, and present all over a bright reddish-pink color.

In order to reach these desiderata, the corned beef, as it is received from the pickling cellar, is inspected in regard to its quality and its percentage of salt.

It is always advisable to wash it in cold water, to free it from old pickle, and almost always the canning foreman will have to soak it in cold water over night to dissolve the excess of salt. This soaking water should be pumped to the evaporating room for extract purposes.

The corned beef should then be boiled either in steam-jacketed kettles or in tanks heated by perforated steam coils. In fact, since the corned beef cooking waters are not much good for extract purposes, giving it a kind of "cheesy" taste, the latter system of boiling is generally in use as being more economical in

consumption of steam and as the canner has no wish to keep the cooking waters concentrated.

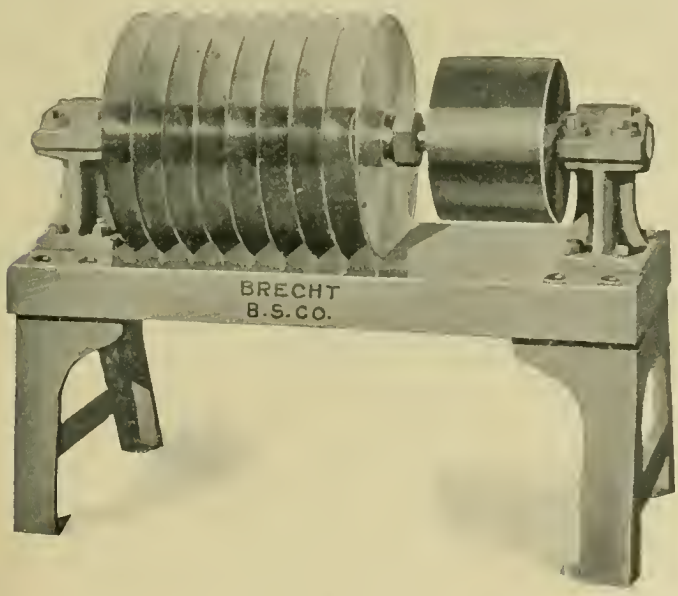


Meat Boiling Box

There is no general rule to regulate the length of time required for this first boiling of corned beef. It depends upon the quality of the meat and also upon the temperature of the boiling water.

The writer has been in charge of a plant located some 5,000 feet above sea level, where water boiled at about 203½ degrees Fahr., instead of 212. It was found that the meat had to be boiled nearly twice the length of time required under ordinary circumstances. If the

meat is too much cooked, the shrinkage by elimination of constituent liquors is considerable and is a great loss in weight, and, therefore, in money to the packer. It is also a loss to the consumer in nutritious elements. If the meat is not enough boiled we will have the repetition of our experience in canning raw meat, and the product will be of a disagreeable appearance and unsalable. Every canner will, therefore, have to study what is required for his local conditions and the suggestions which I give below are only intended to start him on the right track. It is customary in many canning plants to boil corned beef for a certain time, say



Rotary Meat Cutter

20 minutes, and then shut off the steam and let the meat soak in the hot cooking water for another 40 minutes. This is supposed to lessen the shrinkage which sometimes reaches 38% when the meat is boiled for one hour, as it is customary in other places.

The corned beef, when boiled, is forked out of the boiling vats, trimmed on the trimming table, to free it from all sinews and skirting, and cut in small pieces to suit the size of the opening of the tin cans. Some canners slice the corned beef in the power rotary cutter previous to boiling in order to reduce the time of cooking; this leaves very little hand-work to be done after cooking. Others do nearly all the trimming on the fresh meat before it is sent to the pickling cellar, and cook the meat in the condition in which it comes from the pickling vats. But after the boiling they pass the meat through the "Mammoth" meat-cutter which reduces the meat into pieces suitable for the stuffing machines without any hand work.

I have seen both methods employed with equally good results. However, I consider the second as preferable, when there is no rush in the boning room, as I do not see any good reason for pickling trimmings which have to be rejected afterwards.

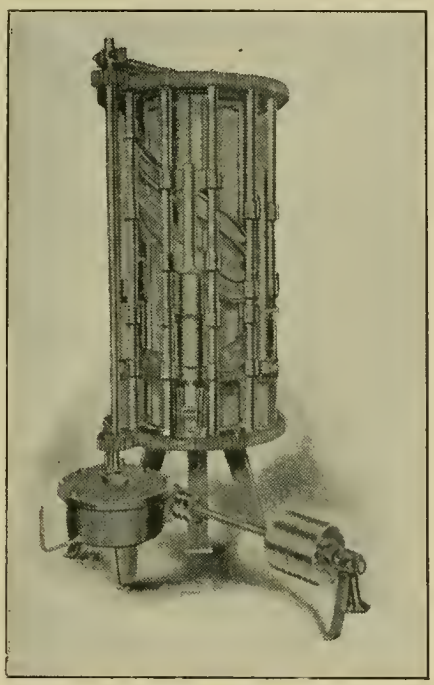
The meat then passes into the hands of the scaler who weighs the amount of meat required to fill the can, and he, or his helper, places the proper quantity of meat in the hopper of the stuffing machine.

Whatever may be the kind of stuffing machine in use, either the single stuffer or the rotary machine, the cans should be prepared in advance and a certain amount of "stock" deposited inside before they are placed under the hopper.

The "stock" is a jelly which everyone can prepare by dissolving 1 lb. of white sheet edible gelatine in a gallon of water. Pork packers often prepare this jelly by a long ebullition of rinds, snouts, pigs' feet, etc. Calves' feet give also a very good jelly.

Coloring this jelly slightly by the addition of burnt sugar or dark syrup adds to the appearance of

the finished product. The quantity of stock which is generally added to the meat is given at the end of each special class of product described later on. The plunger which is working inside the hopper of the stuffing machine presses the meat into the can. This can,



Rotary Can Stuffer

roughly filled, is seized by a second scaler who carefully examines its weight, picks off the excess of meat or adds the necessary quantity on top of the can in order to balance the scale as set up by the foreman.

Next come the operators who finish the stuffing by hand with a wooden stick in order to push the meat low enough so that it may not interfere with the work of the capper; then the wipers wipe the top of the can, and especially the groove where the cap sits, as this

part must be perfectly clean and free from all particles of meat in order to insure a neat and perfect capping.

Put the caps on the cans, pass them to the helper of the capper who places the cans under the spindles of the machine, rub the groove with a small brush wetted in the soldering flux, and finally take them out when capped and the solder hard enough, and if the inspector is satisfied that the capping is good, *i. e.*, that there is no hole left which would allow the air to pass through later on, the can is ready for the venting process.

I have already explained that the venting process has for its object the creation of a partial vacuum inside the can. This vacuum will make the can "collapse" slightly under the effect of the outside atmospheric pressure, *i. e.*, the square cans of the corned beef type will show on the sides a slightly concave appearance, and the round cans will have tops and bottoms "drawn." If, after venting, the can does not show the appearance above described, there must be a hole somewhere through which the air has been able to pass and destroy the vacuum, and this hole must be detected and patched immediately, and the vacuum applied again.

The grocer knows this fact and does not consider as good, a can which gives a springy reaction under hand pressure.

As we have explained in previous chapters, not long ago the "venting," or exhausting of the air was made "under water" or "in the retort." To-day, it is only for the 14s that the above systems are still in use, on account of their size. But, nearly everywhere, the 1s, 2s and 6s are exhausted with the aid of the vacuum tipping machine which does quicker and

cleaner work and saves considerable handling of the cans. At the same time, the cans collapse immediately and the leaks can be detected and repaired instantly.

The following table is given only as a help and reference to canners intending to use standard size corned beef cans. It shows the amount of cooked meat and stock which are generally stuffed in each size. Also the vacuum in inches of mercury which is generally used when running the filled cans through the vacuum tipping machine.

The length of process is given for sterilization in open vats under boiling water, as this process seems to give better results for corned beef. The quality is superior, and, owing to the previous "cure" in salt, there is no danger of further fermentation.

However, the length of the process can be greatly shortened by processing in the steam retort at a higher temperature as will be shown in the tables at the end of the volume.

Corned Beef

SIZE	MEAT	JELLY	Vacuum	PROCESS
1	13¼ oz.	¾ oz.	21	3 hrs. 30 min. under water.
2	27 oz.	1 oz.	21	4 hrs. under water.
6	5 lbs. 11 oz.	6 oz.	21	6 hrs. under water.
14	13 lbs. 2 oz.	16 oz.	20	1 hour 45 min. open vent in the retort under 4 lbs. pressure.—Then 5 hrs. 15 min. under water with closed vent.

Roast Beef

The preparation of so-called "roast beef" is a different proposition from that of corned beef.

A few years ago roast beef was in fact a kind of short and mild cured corned beef. To-day, and not without reason, the trade does not want any more "roast beef" with the corned beef appearance. The product is required to present a rather gray or at least a light pink color like that of cold overdone home-baked roast beef.

To bake roast beef rare in a kitchen range and stuff it into cans would not give the produce that one would expect. For the reasons already explained at the beginning of this book, *i. e.*, on account of the processing of the can, the meat would simply turn out like a piece of boiled beef in cooking soup.

In canned roast beef the baking of the meat results from the high temperature of the process in the retort (240 degrees Fahr.).

Previously, the meat should be slightly boiled, or rather cooked in a steam oven, in order to expel the constitutive liquids as in the case of corned beef; the consumer expects a solid piece of meat and does not wish to buy broth or gravy.

Not only in order to bake the meat, but also in order to insure the perfect keeping of the product. the roast beef has to be processed at a very high temperature. Here, indeed, the canner has not the presence of a highly salted meat and his security against the action of spores is lessened. He must, therefore, try to destroy not only the bacteria, but also the spores by the use of a high temperature.

When the product is required to be entirely gray, no previous cure is advisable, but the fresh meat should

be soaked in iced water for 12 hours before canning, in order to get rid of the blood.

Should a certain pink color be desired, a short cure of 72 hours in the following pickle has given splendid results, viz.: Water 100 gallons, sugar 100 lbs. The pickling vat has to be kept in the cooler at a low temperature.

The soaking water of the first process, as well as this sort of sugar pickle, should be saved for extract as they give a splendid product.

Where the cooking waters are not saved for extract the salt that has to be used in order to make the product palatable may be added in the cooking kettle.

But the roast beef cook waters are of so much value for extracts that, if extract is made, I would recommend boiling the meat in steam-jacketed kettles in a very limited amount of water and without any addition of salt.

The salting of the meat will then be done either by dissolving the necessary amount of salt in the jelly (stock) or by putting the required amount of salt directly into the cans previous to stuffing. Below are figures for the latter system. Needless to say the seasoning can be modified in order to suit the taste of the consumer.

R. B.

Size	Meat	Jelly	Salt	Vacuum	Process
1	13½	2	½ oz.	23	2 hrs. at 10 lbs.
2	25	3	1 oz.	23	2½ hrs. at 10 lbs.
6	88	8	3½ oz.		2 hrs. open vent in retort at 4 lbs., then 2¼ hrs. closed at 9 lbs.

Tongues

Ox tongues, pig tongues, lamb tongues, are also part of the staple articles in the list of canned meats. They are treated in a manner similar to that for corned beef as far as curing and cooking are concerned. But they are put up whole, and, therefore, the stuffing has to be done by hand.

On account of the dimensions of the pieces the openings in the cans are comparatively large, and a little skill is required in order to pack a can that will look nice and full when opened. Still more skill is required for the filling of glass jars where it is very important that the meat should touch the glass all around and look neat and bright, with as little jelly as possible.

The hole remaining in the center of the package is filled with trimmings.

The tongues are cooked according to the time given below as an average. Owing to the high prices prevalent for canned tongues it seems time that more attention should be paid to their seasoning than is generally done.

When cooked, the tongues are skinned and trimmed. The skin of the tongues is very easily removed when they have been fully cooked. The average time of boiling the tongues is the following:

Ox-tongues.....2 hours.
Pig tongues.....1¼ hour.

The boiling water will show on the surface a certain amount of fat which is well worth saving. The tongues for canning purposes must also be trimmed, as only the lean part is put up in tins or glasses. Therefore, all fat as well as all bones from the gullet should be removed.

The fat trimmings are sent to the tallow department, and the lean trimmings, which are not employed for filling the center of the can, may be chopped for the manufacture of potted tongues, or used in the sausage department.

All of these trimmings go to the credit of the canned tongue article.

Ox tongues are generally packed up in sizes called 1½, 2, 2½, 3 and 6; Pig tongues, generally called "lunch tongues," are packed up in sizes called ½, 1 and 6s.

Curing. The curing of the tongues is similar to that of beef, generally speaking. The tongues, however, have to receive special attention on account of the blood and saliva with which they are covered. Passing them through a revolving washer as soon as they are taken from the head is to be highly recommended. If this is not possible the tongues have to be washed carefully in lukewarm water and then sent to the cooler where they are hung, points down. When perfectly chilled they should be first cured in strong plain pickle for a day at least This will remove all saliva and the tongues are then ready for curing in sweet pickle.

Stuffing, Jellying, and Processing Table

	Size	Meat	Jelly	Vacuum	Process
Ox	1½	1 lb. 6 oz.	3 oz.	21	3 hrs. 15 water
"	2	1-12	5 oz.	21	3 hrs. 30 water
"	2½	2-3	6 oz.	21	3 hrs. 50 water
"	3	2-11	6 oz.	No	Open vent 2 hrs., closed 2 hrs. water.
"	6	5-14	4 oz.	No	Open vent 2 hours, closed 3 hrs. water.
Lunch	½	7 oz.	½ oz.	21	1 hr. at 220 (2½ lb. pressure)
"	1	11 oz.	1 oz.	21	1¼ hr. at 220 (2½ lb. pressure)

Dried Beef

"Dried beef" is beef cured in a similar manner to corned beef, although in a sweeter pickle. The meat when fully cured is then dried and smoked and constitutes a very nice article of food when well prepared.

Manufacturers of dried beef generally reserve the rounds of beef for that use. Out of the rounds three pieces are made in the standard cut, the names of which are "inside," "outside" and "knuckle." The knuckle is the best piece owing to its shape, then comes the outside, then the inside. The two first named cuts, being rather large, require a longer time to be fully cured to the center. However, I do not advise pumping them with pickle when they are prepared for canning purposes. Dried beef for the canning room has to be dried a good deal more than dried beef prepared for sale on the shop counter. Pumping introduces a great quantity of moisture in the very center of the piece and, therefore, the drying process needs to be lengthened. Unless the packer can install a properly heated and ventilated room for drying, he will find that losses will occur in the drying room rather than in the curing cellar, and that is the reason why I do not recommend pumping the meats that are intended for the canning department.

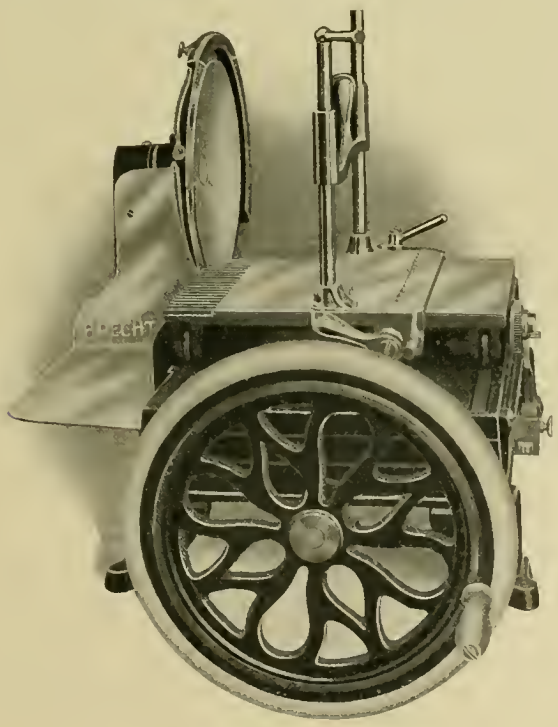
If the meat is carefully overhauled every week it will be found fully cured in 60 days; but it may be kept in sweet pickle for another two months if necessary without overhauling again.

The meat should be then carefully washed in cold water. If beef hams are old, soak them in cold water according to the following schedule:

Days Old	Hours to Soak	Change Water
60	10	2 times
75	12	2 times
125	20	3 times
Over	30	3 times

Hang the pieces in a cool, well ventilated room in order to drain all free water; this will require from 24 to 48 hours, according to the conditions of temperature. This may also be done in the smoke-house when there is room enough for it. Smoke 24 hours at least, keeping the smoke-house at 150 Fahr., and then hang to dry in a well-aired room, kept at a moderate temperature, for a time ranging from 5 to 10 days.

In plants where smoke-houses are provided with a steam-heating system, the drying process will require only 200 hours at 150 degrees.



Canning. The first grade, "sliced dried beef" is made out of the knuckle pieces.

The second grade, "chipped beef," is made out of the other pieces and from the trimmings of the first grade.

The first grade is generally put up in glass jars. Slice with a good slicing machine, fill the jars according to the following table, put the top on, then run through the vacuum machine, allowing all possible vacuum (27 to 28 in.). When dried beef is put up in tin cans, use special chipped-beef cans. These cans are supplied by the manufacturer with the entire top detached from the body of the can. Fill the can with the required amount of sliced meat, put the top on, float the can, *i. e.*, solder the top to the body by rotating quickly in a solder bath, then exhaust the air in the vacuum pot at 28 in., and tip.

Filling in Jars		Filling in Tins	
Size	Meat	Size	Meat
½	5 oz.	½	4½ ozs.
1	9 oz.	1	8½ ozs.

Sliced Bacon

Use only high grade, fully cured and well-smoked bacon. Slice carefully with the slicing machine, stuff and seal same as explained for dried beef.

Fowl (Chicken and Turkey)

Fowl is generally put up in the state of boneless chicken or turkey. For this purpose the birds are boiled in salted water, seasoned with a bag of spices, until they can be boned by hand easily.

Then the bones and skins are boiled in a limited amount of water until the soup attains the consistency of a jelly. This jelly is made perfectly palatable by the addition of ½ lb. salt to the gallon, and pepper and spices to taste.

The meat is then stuffed tight into the cans by hand, with the addition of jelly, and processed according to the following table:

Size	Meat	Jelly	Vacuum	Process
½	6	½	21 in.	1 hr. 45 min. at 9 lbs. steam pressure.
1	13	1	21 in.	2 hrs. 15 min. at 9 lbs. pressure.

A better result is obtained by previously curing the fowl for 12 hours in a dry cure made of half salt and half sugar and spices to taste; the proportion of the mixture to the meat is 4 to 100. Fowl may also be browned in a steam kettle with the addition of lard, onions, etc., after boiling. The cook water of fowl is a precious element in the manufacture of meat extracts.

In Europe whole or half chickens, not boned, are put up in jelly in tins of an oval shape. In that case, only young birds are used, and they are generally browned in the oven or in a steam kettle at a high temperature before being canned and covered with meat jelly.

Potted Meats

Preparations called "potted meats" are generally put up in #¼ and #½ sizes, and when carefully prepared constitute a very wholesome article of food, very convenient for the preparation of lunch dishes, sandwiches, etc.

They have the advantage of enabling the packer to dispose of small pieces, trimmings, etc., which, although having the same nutritive value as other cuts, would not find an easy sale under that form. Before the enactment of the recent pure food laws, now in force in all civilized countries, a few packers had

given a bad reputation to this class of canned meats by using inferior materials in their preparation, but that time has passed and the consumer of Government-inspected foods knows that he is buying what is described on the label.

Another class of potted meats is packed up with a small addition of amylaceous matters and constitutes what is known under the name of veal loaf, chicken loaf, ham loaf, beef loaf, etc.

I give below a table showing the stuffing and processing which is common to all potted meats put up in standard tins, and also a few formulas for the preparation of the meat. These formulas can be varied indefinitely and in order to suit the requirements of the packer as well as those of the trade.

Stuffing and Processing

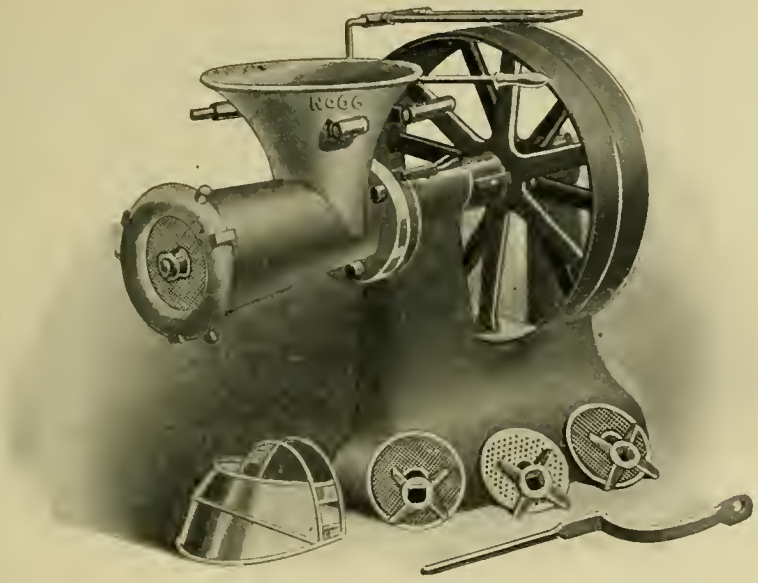
Size	Meat	Vacuum	Process
¼	3½ oz.	21	1½ hours at 10 lbs.
½	7 oz.	21	1¾ hours at 10 lbs.

Potted Ham

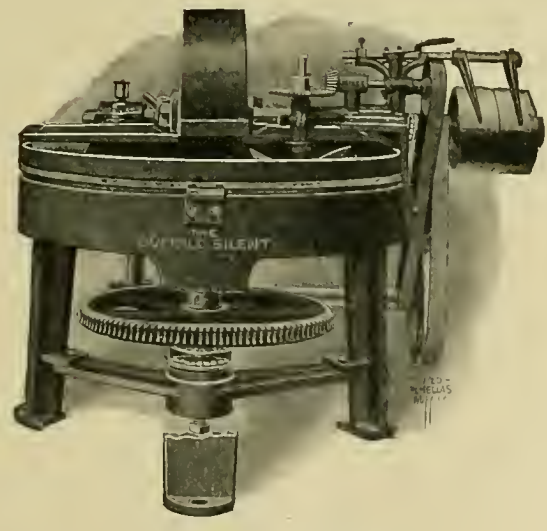
Use ham trimmings which have been cured from 8 to 10 days and smoked on trays in the smoke-house. Cook these trimmings 15 minutes in boiling water, pass them through the ⅞ plate of the "Enterprise" chopper, then finish chopping in the "Buffalo" cutter, adding to a 400 lbs. batch of meat the following spices:

Ground mustard.....6 lbs.
White pepper.....1 lb.
Red pepper.....2 oz.
Mace, cloves and nutmeg to taste.

Water, up to the proportion of 4 lbs. per batch of 50 lbs., may be added during the chopping in the "Buffalo."



Enterprise Chopper



Buffalo Chopper

Potted Meat

There is no formula for potted meats where almost all kinds of meat trimmings may be used as in the manufacture of Bologna-sausage. When it is desired to give a smoky flavor, dried beef may be used instead of ham trimmings.

Potted Tongue

The base of "potted tongue" is the trimmings of the cured tongues which are put in cans. Use the following spices for 50 lb. of ox tongue trimmings:

White pepper	2½ oz.
Cayenne	2 oz.
Mace	2 oz.
Cloves	2 oz.
Nutmeg	2 oz.
Water	2 lbs.

Deviled Meats

Deviled meats are prepared in the same manner as potted meats; the seasoning alone is different, a greater quantity of cayenne pepper and spices being used.

Pate de Foie (Liver Pate)

This is a very nice preparation for sandwiches. It is stuffed and canned like ordinary potted meats. It must not, however, be confounded with the French "*Pate de foie gras*," which is made of goose and duck livers and is a fancy and very expensive article. Our potted liver is made as follows:

Chop fine.

Pork liver	1 part
Fresh pork fat	2 parts
Lean pork meat	½ part
Spiced salt	3 oz. per lb. of product

Chop the meat when raw and cook slowly in a steam-jacket kettle without any addition of water. Stuff when hot. The formula of spiced salt, which is a very convenient one in many cases, is given later.

Veal Loaf

To work out the following formula, first cook the meat about 30 minutes, then run it through the "Enterprise" chopper and the "Buffalo" cutter, then add the milk, flour and spices. Hash very fine and stuff. Cap and run through the vacuum pot at 17 in., then process as follows:

#½ ..... 2 hours at 10 lbs.
#1 ..... 2½ hours at 10 lbs.

Formula

Meat	50 lbs.
Corn meal	2 lbs.
H. M. P. flour	2 lbs.
White pepper	4 oz.
Mace	½ oz.
Sage	1 oz.
Sweet savory	¼ oz.
Milk	1 quart
Sugar	1 oz.
Eggs	6
Salt	2 lbs.

Jellied Veal

Cure in salt for about 14 days in order to absorb most of the excess of moisture. Cook only 10 minutes in boiling water. Stuff same as corned beef, but use only a very light jelly, as the meat will produce jelly by itself. Some seasoning will greatly help to improve the taste of veal meat.

Corned Beef Hash

Formula

Corned beef.....45 lbs.
Salt pork trimmings.....3½ lbs.
Potatoes.....45 lbs.
Eggs.....24 lbs.
Onions.....6½ lbs.
Pepper.....8 oz.
Spices to taste.

Potatoes should be boiled 20 minutes before peeling and a certain proportion of water and oleo oil, as a fat, may be added if necessary.

Compressed Ham

Compressed ham is generally made of ham trimmings. First trim off the fat, then boil the meat in open vats for 25 to 45 minutes, according to the size of the pieces.

Fill the cans according to the table given below, using a jelly well prepared and seasoned to suit the trade.

Size	Meat	Jelly	Vacuum	Process
1	10 oz.	2 oz.	21 in.	3 hours at 226 Fahr.
2	22 oz.	3 oz.	22 in.	4 hours at 226 Fahr.

Irish Stew

Boned mutton is cut into suitable pieces and put in the steam-jacket kettle with just enough water to cover it. The usual flavoring made of spiced salt, parsley and onions is added. The whole is simmered until the soup has been reduced half its volume. It is then ready to can and process.

French Stew

Mutton shoulders are generally used. First, fry the boned meat in hot grease (oleo stock is generally used in large packing plants). Can the meat and cover with stock made as follows: Add to the hot fat in the jacket kettle ¾ lb. flour for every lb. of soup (to thicken and brown it) and, when brown, thin the sauce with diluted extract until the required quantity of sauce is obtained. Add a few vegetables and spices to taste.

Stewed Kidneys

Cut the kidneys in large pieces and remove all the fat. Then soak the pieces first in cold water, and afterwards in hot water.

Put 40 lbs. of kidneys in the steam-jacket kettle with the addition of 5 lbs. oleo fat as frying stock, and 2 lbs. minced onions. Add 2 lbs. flour and 2 lbs. of the following spices:

Salt	8 lbs.
Pepper	14 oz.
Cayenne	¼ oz.
Paprika	¼ oz

Other spices to taste.

Fill #2 cans with 20 oz. meat and cover with "stock." This should be the ordinary stock thickened with flour and flavored with spices to taste.

Tripe in Milk

The cleaned tripe is boiled in wooden vats or enameled steam-jacket kettles, as steel or cast iron kettles would turn it black. Even in wooden vats a wooden perforated false bottom must be provided to prevent the contact of the tripe and the steam pipes.

When the tripe is cooked and tender, it is cut in strips, then rolled into rolls and stuffed into the cans.

The can is then filled with a soup made of milk to which is added salt in the proportion of 5 lbs. of salt to each 10 gallons of milk.

Size	Meat	Milk	Vacuum	Process
2	26 oz.	3 oz.	23 in.	3 hours at 10 lbs.
6	5 lbs. 8 oz.	8 oz.	23 in.	6 hours at 7 lbs.

Tripe "A la Mode de Caen," (French Style)

The cleaned tripe is cooked slowly for 6 hours in jacket enameled kettles covered with a well-fitting lid. To each 20 lbs. of fresh tripe add the following ingredients:

Lard	1 lb.
Calf's feet	4 pieces
Salt	9 oz.
White pepper	¾ oz.
Cloves	⅓ oz.
Vinegar	1 pint
Onions	4
Carrots	4

Thyme, parsley, bay leaves.

Then can and process 1¼ hours at 10 lbs.

Mince Meat

Cook 2 lbs. beef in boiling water, then stand aside over night to cool. Then chop the meat together with the following ingredients:

2 lbs. beef suet.	½ lb. candied orange peel.
4 lbs. apples.	2 lbs. layer raisins, stoned.
1 lb. citron.	2 lbs. currants.
½ lb. lemon peel.	2 lbs. seedless raisins.

Mix well all together and then add the juice and rind of:

2 oranges,
2 lemons.
2 nutmegs, grated.
¼ oz. cloves.
½ oz. cinnamon.
¼ oz. mace.
1 teaspoonful of salt.

Mix well and put in stone jar, covering with one quart of sherry and one quart of brandy.

Chile Con Carne

This is a favorite dish of the Mexicans and of many people in Central America. It is manufactured to a certain extent by the Chicago canners for supplying their Southern trade.

Recipe: The principal element of the seasonings is a kind of large, sweet, red pepper—called by the Mexicans "Chile Ancho."

First remove all seeds, then cook the fruit in boiling water in a steam-jacket kettle until it can be run through an "Enterprise" chopper to make a pulp.

Then take 100 lbs. of beef and grind through medium plate of the "Enterprise" chopper.

Put the Chile pulp and the meat and spices in the jacket kettle, using the following proportions:

Meat	100 lbs.
Chile pulp	15 lbs.
Salt	2¾ lbs.
Garlic	½ lb.
Cumina	7 ozs.
Oregano	5 ozs.
Water	8 gal.
Cayenne pepper	8 oz.

Keep boiling until the meat is well cooked, then spread in the jacket kettle 3 lbs. of flour, to thicken the sauce, and pack in cans.

White beans may be added in each can. The beans should be cooked in water in a separate kettle, in order to keep them whole, as the mass of meat must be kept stirring all the time it is cooking.

Should the meat be too lean, some fat, such as oleo oil, may be used to soften it.

Pork and Beans

I am sorry to say that this favorite dish of so many people, which is, in fact, so dainty when properly prepared at home, does not receive from the average packer the attention which it deserves. The meat packing industry has undertaken its manufacture because it is a means of securing a sale for some cuts of pork which, when raw, would meet very little demand. And the idea was a good one indeed. But the competition in selling prices has induced the packers to cut down, more and more, the proportion of pork in the product, so that the buyer is sometimes disappointed with what he buys. Let the buyer stick to the best brands. He will have to pay a few cents more, but he will get what he expects.

The beans are first soaked in cold salted water for 12 hours previous to cooking. They are half-cooked in boiling water, the water being carefully skimmed, and then sent to the drain. This process washes away the matter which causes a bitter taste in the product and also the slimy products which impair the appearance of the liquid surrounding the canned beans. Now, in order to put up a uniform product, the canner must weigh carefully the quantities of beans and also of the soup to be put in each can. Indeed, during the processing of beans, which is long and at high temperature, the beans will keep on cooking, softening and absorbing a certain amount of the soup. Should the proportion of

the liquid to that of the beans be too small the product, after the process, will be altogether too dry, and will become still drier after a few weeks in the storage room. Another danger is the excess of liquid, which does not suit the consumer.

In practice, and when the filling of the cans is done by hand, special cups are prepared, both for the cooked beans and for the soup, holding a certain weight of each of these constituents. They are filled close to the top edge and their contents stuffed into the can with the aid of a funnel. The can then passes into the hands of a scaler who makes up the required net weight by adding or subtracting some of the liquid.

The filling of cans by machine has now taken the place of hand-filling in up-to-date plants, as a labor-saver and a guarantee of uniformity.

Different soups are prepared to be added to the beans and thus the packer is enabled to market what is called "Plain Beans," "Beans with Tomato Sauce," etc. But the proportion of pork deposited in each can previous to the filling with beans and soup generally remains the same.

The proportions as given below are an average. All beans have not the same cooking and absorbing properties, nor will all waters cook the beans in the same manner. Consequently a few experiments have to be made at the start, as well as each time that a fresh supply of beans is brought to the canning department.

Stuffing and Processing

Size	Pork	Beans	Soup	Vacuum	Process
1	1 oz.	6 oz.	4 oz.	15	2 hrs. 30 min. at 10 lbs.
2	2 oz.	12 oz.	8 oz.	15	2¾ do.
3	3 oz.	21 oz.	12 oz.	15	3 do.

Soup for Tomato Sauce	Soup for Plain Beans
Water.....25 gal.	Water.....25 gal.
Tomato pulp.....25 gal.	Brawn stock chopped fine.....12 lbs.
Sugar.....25 lbs.	Sugar.....25 lbs.
Salt..... 4 lbs.	Salt..... 5 lbs.
Pepper..... 6 oz.	Pepper..... 6 oz.
Spices to taste.	Spices to taste.
Boil this soup 15 minutes at least.	Boil this soup ½ hour.

N. B. Processing beans in the retort at a high temperature has generally the effect of baking them, *i. e.*, of giving them a rather brownish color. The same pack of beans if processed under water at the boiling point will turn out of a lighter color. The canner must meet the requirements of the trade, but the process in the retort at a high temperature is certainly safer and, of course, quicker.

When beans and soup are stuffed hot into the cans and the capping and tipping are done immediately, without allowing the can to cool, there is no necessity of using the vacuum machine;—the ends will "draw" sufficiently when the can has cooled.

Soups

Very nice soups can be put up in the canning department of a packing house if the foreman canner has the inspirations of a good cook, as he then can dispose of a great quantity of material to advantage.

The greatest part of the contents of a tin of soup being liquids, the process to be applied will be lighter and shorter than that supplied to meats, as the liquids are better conductors of heat, and the sterilization will thus be easier.

Soups are generally put up in sizes called #1, #1½, #2. Below is given the process-time generally considered as sufficient for the different sizes.

When the cans are filled with hot liquids, and capped and tipped immediately, no exhausting is necessary, the heat of the liquid expels enough of the air contained in the air-space to "draw" the ends of the can when the contents are cold.

Cans for soups may be made of light tin-plate, and, by having the bottom made of a very light tin-plate, the consumer will be able to cut it with a pocket knife; no key-opening device is generally adapted to this class of cans.

Stuffing and Processing

Size	Process
No. 1	55 min. at 230
No. 1½	60 min. at 230

Recipes for Soups

Consomme

Boil fresh beef trimmings or dilute extract of beef in the required quantity of water to produce a rich broth, boil 15 minutes with a few vegetables (carrots, turnips, onions), pepper and spices to taste, strain and filter, can and process.

Roast beef cook-waters can be used with advantage and take the place of the extract.

It will be only necessary to let them simmer in the kettle up to the proper concentration point and then act as above explained. Coloring, if required, can be given with burnt sugar.

Vegetable Soup

Cut in small cubes a quantity of carrots, turnips, parsnips and a few stalks of celery. Blanch these vegetables in boiling water for 10 minutes. Some green peas may also be added. Now prepare the same broth as described for the consomme, but without the addition of other vegetables during the boiling. The broth can also be made slightly lighter.

Then fill the cans with the cut vegetables up to a quarter of the height, finish filling the cans with hot consomme, cap and tip and process.

Pea Soup

Soak one bushel of dried peas in lukewarm water over night; the next morning send the soak-water to the drain, place the peas in a steam-jacket kettle, covering with water and adding the following:

Lard	10 lbs.
Smoked ham trimmings	5 lbs.
Carrots	3 lbs.
Onions	3 lbs.
Salt	2½ lbs.
White pepper	3½ oz.

Other spices to taste.

Keep gently boiling for an hour, then crush through the finest plate of the "Enterprise" chopper, pass through a hair-sieve and put the paste back into the jacket kettle, to keep it hot, adding to it enough water to get the required consistency. Then fill the cans, cap and process.

Tomato Soup

Scald the tomatoes, crush them, put them in the jacket kettle, adding sufficient water. Keep boiling an hour, adding 2 lbs. of lard for each 20 gallons of soup.

Thicken the soup with the addition of 1 lb. of rice flour to each 20 gals., also 2 lbs. of salt, a pinch of pepper and spices to taste. Then strain carefully through a hair-sieve, and put back in the kettle to keep hot.

Swell some rice in boiling water for 20 minutes. Place 2½ ozs. of the swelled rice in each #1 can, fill with hot soup, cap and process.

Ox-Tail Soup

Concentrated ox-tail soup is made of the concentrated broth obtained by boiling ox-tails for 4 to 5 hours with a few vegetables, salt and spices to taste.

The broth should then be strained and clarified, and colored with burnt sugar if necessary. The meat should be taken out of the bones, which are sent to the tank house, and the cans are filled as follows:

#1 cans. Boned meat ..... 1½ ozs.
Broth..... 8 ozs.
Swelled pearl barley..... 1½ ozs.

When cold this concentrated broth will become a jelly.

Chapter VI.

By-products of the Beef Department

The beef by-product department and the canning department must work together in order to get the maximum of salable products out of the cattle slaughtered for canning purposes. It is only owing to this combination that the large packers of the United States, Argentina and Australia have been able to place on the market a line of canned meats, such as corned beef and roast beef, which sell so cheaply that the housekeeper herself cannot figure on making her own cooked meat at the same price, when she is aware of the fact that the shrinkage of beef meat in cooking amounts to 33%, and that the bones are of no value whatever for food purposes. This result is obtained as follows: Canning cattle are generally bought at a rather low figure, not being fat enough for the retail butcher's shop. When canning cattle are slaughtered for the canning department the best cuts are generally saved, which can be sold fresh at a good figure and this goes to the credit of the canned meat.

Moreover, the meat has to be boned, and the packer should save these bones which, when fresh, will render valuable liquors for extract purposes, fat and marrow, and can then be sold either as hard bones or for chemical purposes, according to their quality.

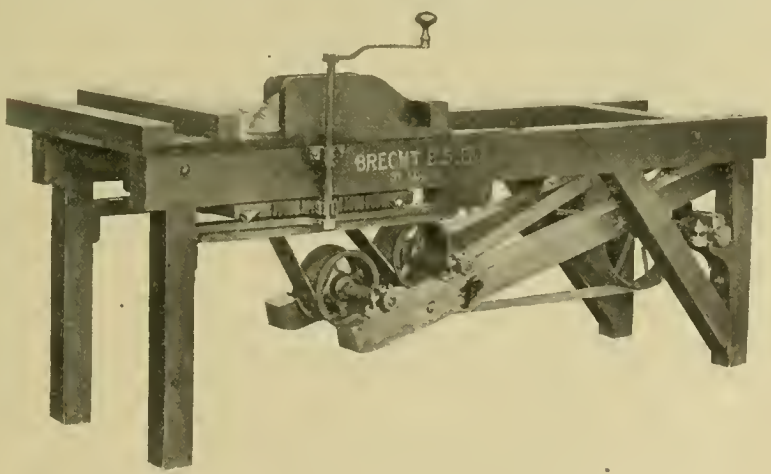
Again, the meat generally has to be soaked and boiled, and, as the water dissolves a great part of its soluble and nutritious elements, similar to those contained in ordinary beef broth, it may be saved and con-

centrated by evaporation for the manufacture of beef extract. I shall, therefore, say a few words about the treatment to be applied to the bones and respecting the manufacture of meat extracts.

Bones

Packing-houses where no canning department is in operation only consider the sale of the skulls, jaws, and shins or shanks, as they are called indifferently. These shins are very valuable when they have been treated properly and may be sold as hard bones for the manufacture of knife handles, brush handles, buttons, and many other purposes.

When the carcasses of beef are boned for canning purposes the canner disposes of another series of bones which are just as valuable as the shanks. I refer to the cannons and the clods in the fore-quarters, and to the thighs and buttocks in the hind-quarters.



All these bones undergo the same treatment as the shanks. The ends or knuckle pieces are sawn off with the power bone-saw so as barely to expose the marrow. The bones are then cooked for about 6 hours in water

at the temperature of 190 degrees Fahr. The liquid is then allowed to settle for an hour. All grease on top of the water is skimmed off and saved, and the bones are sent to the revolving washer to be perfectly freed from all meat, and cleaned. When perfectly clean and white they are spread on racks in the drying room, where the temperature should be kept at 85 or 90

Bone Washer and Polisher

degrees Fahr., no more. Great care must be exercised not to boil the cooking water nor to overcook the bones. This would have the result of dissolving part of the gelatine of the bones. The bones would turn out "chalky" and become unsalable as hard bones, and the cooking waters would contain too much gelatine to be of any use in the extract room.

The other bones, rib-bones, back-bones, etc., generally retain a larger proportion of meat adhering to them. The best way to treat them is as follows: First, cook them at a rather low temperature (150 degrees Fahr. will be enough) and save this water for

extract. Secondly, reboil them at 212 degrees for a longer time, in order to render all the fat.

After that they may be sent to the tank-house, or be treated for the manufacture of glue, but this subject is outside the scope of this treatise. In any case, and in order to get the best price for them, they must be thoroughly cleaned by passing them through the revolving washer, and they must be completely dried.

Extract of Beef

This is another by-product of the beef department, which is still more closely connected with the canning department.

Beef extract is the result of the concentration of the soluble juices of the meats. These juices dissolve in the soaking and cooking waters and, not very long ago, were lost and sent to the drain. They are, however, the very elements of the meat savor. They are recommended by many physicians as precious to invalids, and they are also the most valuable help to the modern "chef."

One hundred pounds of beef, "fully extracted," yields, in the chemist's laboratory, 4% of perfectly dried extract. The so-called "solid" extract of the packers contains about 20% of moisture. Therefore, the meat would yield about 5% of commercial solid extract. But the aim of the packer is not to extract from the meat all its soluble principles. He only tries to save that proportion of them which would be lost during the different processes of manufacture. In practice the yield in extract of the meats handled in the canning department is much below the figures given above.

However, with the present price of meat extracts, it will be easy to figure out the loss sustained by the packer who does not save the liquors from the canning department. Commercially speaking, I may say that beef extract is a compound of the different extracts obtained by the concentration or evaporation of the soaking or cooking waters of beef or bone liquors handled in the canning, and, sometimes, in the sausage departments.

These liquors are generally evaporated by themselves up to the required density, because each of them presents different characteristics in taste, flavor, color, etc., and afterwards, definite proportions of them are compounded together to make up the finished product.

Pure extract should contain no fatty matters and as little gelatine as possible.

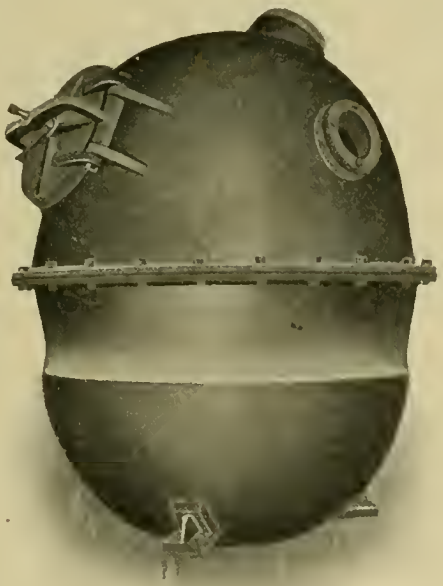
Of course it might be possible to evaporate these liquors in open steam-jacket kettles. But, not to mention the time required for the process and the high steam consumption, the temperature of the boiling liquid and that of the walls of the kettle are liable to "bake" some of the solids contained in the liquors, and to impart to them a disagreeable flavor.

A great improvement is obtained by the use of a revolving cylinder similar to that employed as "stick driers." Low-pressure steam is allowed to circulate inside the cylinder. The liquors to be concentrated are run as a thin film on the outside of the drum, and, owing to the great surface of evaporation, the process is considerably lessened. This apparatus is the one I would recommend for small plants as it involves only a light expense in machinery.

Where considerable quantities of liquors are evaporated every day the packer looks more closely to the

steam consumption than to the cost of the apparatus, and, consequently, he prefers the vacuum evaporators.

By artificially lessening the atmospheric pressure on the top of a liquid the temperature of ebullition is considerably lowered. Thus disappears the danger of "baking the product." Moreover, the air-pump which creates the vacuum will at the same time take care of the vapors produced by the ebullition of the liquid, and, with the aid of the condenser, will aid quicker evaporation.



Evaporating under a vacuum is also economical as it allows the use of the exhaust steam from jacket kettles, steam engines, etc., for heating. And while a cylinder-drier working under the atmospheric pressure will require as an average 1 lb. of coal to evaporate 10 lbs. of liquor, a double-effect evaporator will evaporate,

with the same quantity of coal, 16 lbs. of liquor, and a triple-effect, 24 lbs.

The main materials which are used for the production of liquors for the extract department are handled as follows:

Beef Hearts

Fresh beef hearts are sometimes difficult to sell. In this case they may be sliced or crushed in the meat chopper, then soaked for 24 hours in cold water, the water being changed two or three times during that period and all these waters being put away in a cooler for further use in the extract department. These heart soak-waters give a very good extract and will yield 2.35/100 of the weight of the hearts in solid extract. When the hearts are treated for extract only an addition of one part of hydrochloric acid to 250 parts of the soak-water will greatly increase the yield in extract.

Corned Beef

Nearly all corned beef used in the canning department has to be soaked for at least twelve hours in cold water in order to wash off the old pickle and to dissolve the excess of salt. These soak-waters contain, of course, part of the meat juices. Their evaporation will yield about 1.50% of extract. This extract alone would be altogether too salty, but it can be mixed with heart or roast-beef extracts. The corned beef cook-waters are not employed generally, as they give a rather disagreeable taste to the product, a "cheesy" taste, as the packer says.

Roast Beef

Roast-beef soak and cook-waters are a first-class material for extract, as only fresh meats are generally used for that purpose. Roast-beef cooking and soaking-

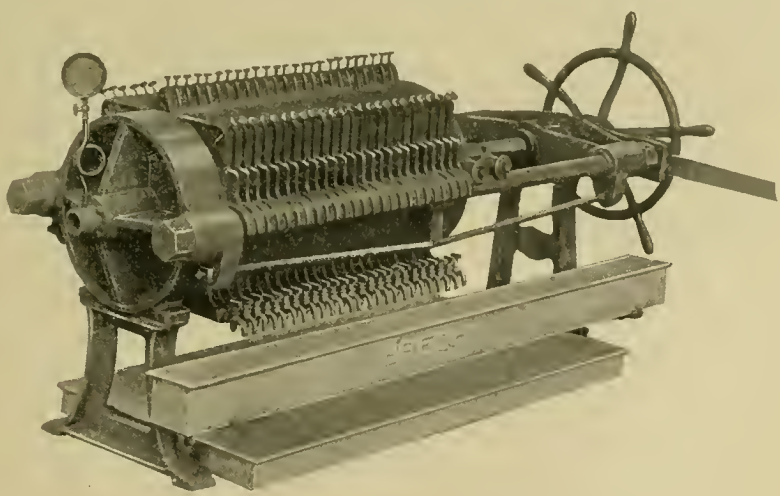
waters when added will yield 2.50% of the weight of the fresh meat in solid extract.

Bone Liquors

All bones from meats cut for the canning department may be cooked for two hours in water at about 150 degrees Fahr. They will render a liquor which can be blended with other liquors for extract and will yield ½% of the weight of the bones. They contain, in fact, a small percentage of gelatine, but, when compounded with above described products, will give a very satisfactory result. The bones are then sent to the bone department for further treatment.

Whatever may be the machinery employed for the evaporation, the operation is carried on in two sections, as follows:

Cook-waters from the canning room and bone-liquors are first boiled by themselves in large flat open vats. Then an equal quantity of soak-waters (gen-



erally called "cellar" waters) is added. The heat produces the coagulation of the albuminous matters which

are dissolved in the cellar-waters and this coagulated albumen forms a scum which rises to the surface. The scum is vigorously stirred in the mass of the liquid, the coagulated albumen having the property of carrying with it most of the impurities in suspense in the liquid, and the liquid is then first strained through a coarse sieve and then pumped through a filter press, or, at least, carefully filtered through flannel bags.

Then the clear liquid is pumped to the evaporators. It is first concentrated to a density of 7 to 8 degrees Baume. Now, if the liquor is not clear enough, some more cellar-water may be added and a new filtration made.

The liquid is then pumped into the finishing pan where it is concentrated into a paste which will contain only from 20% to 25% of moisture. This, when cold, will have the appearance of a heavy dark-brown paste, and is called "solid extract." It contains, as an average, 22% of moisture, 63% of organic substances and 15% of salt. The salt comes partly from that contained in the corned beef soak-waters and the balance is added to the liquor before the last process. It is the only preservative that should be used in the manufacture of beef extract, although some packers also add sugar up to the proportion of 1½%.

Sometimes the concentration is not carried so high and the process is stopped when the liquid marks 20 degrees Baume. This is what is called "fluid extract." It contains 45% of moisture and 10% of salt.

Fluid extract does not keep so long as solid extract, and it is wise to put it in large cans and to give it a process in the retort Then it can be kept for any length of time and may be bottled only at the time of shipping.

Solid extract when put up in well-corked jars and stored in a cold room keeps well. This is why manufacturers first reduce all extracts to a solid. Whenever they receive orders for fluid extract they prepare it by thoroughly mixing 60 parts of solid extract with 40 parts of water.

As already explained, all solid extracts made from different materials are stored in a cold room. When the time for sale arrives definite proportions of each one of them are blended together in a small steam-jacket kettle provided with an agitator (beater). This has not only the effect of thoroughly blending the different materials but also introduces into the paste a certain quantity of air, which will make the color of the finished product a light brown, instead of the dark black color which it had when coming out of the finishing pan.

Bouillon tablets, soup tablets (with or without addition of vegetables), are all derived from meat extract, and they are often found to contain a notable proportion of gelatine.

Beef extracts are on the market under numerous fancy names. Their value should be estimated only by the result of analysis, and their proportion of organic substances.

Chapter VII.

Recent Inventions

The "Auto-Vacuum"

Such is the name given by the inventor, Mr. Aug. Corthay, to an apparatus in which the meat is cooked without any addition of water and in a closed receptacle.

It is in fact a steam-jacket kettle, covered by a dome which can be bolted tightly on the body of the kettle. The meat is put in the kettle without any other addition than the proper amount of salt and spices. Then the lid is secured and the steam turned on.

The name of auto-vacuum applied by the inventor to the apparatus (which seems rather strange when applied to a closed kettle where there is a pressure greater than that of the atmosphere during the cooking process), derives its origin from this fact: When starting the operation, the pet-cock on the top of the lid is left open, allowing all the air possible to be expelled by the first vapors of the boiling. Then it is closed and the meat is stewed in its own vapor.

This first expulsion of the air lasts for a longer or shorter time according to the kind of meats treated. For example, we may mention the cooking of tripe, which, as everyone knows, requires considerable time under water. This time is greatly reduced by cooking under pressure, but the taste would be rather disagreeable if the pet-cock was not kept open for a certain time, thus allowing the first vapors to escape and carry-

ing away all objectionable odors. During the cooking process all the meat juices separate under the influence of the heat, as usual, but, no water having been allowed to come in contact with the meat, they issue in a state of intense concentration and very little boiling is afterwards required to convert them into extract.

In addition to this, the meat has not been deprived of its juices by boiling in water, the shrinkage is no greater as there is no evaporation, but the saving in savory principles is considerable, and the cooking process is very quick, being made under the pressure generated by the vaporization of the liquids themselves, under the influence of the steam jacket.

I really believe that the apparatus is well worth a trial by the small canner who aims rather at quality than at quantity of product. It is also admirably adapted to the cooking of vegetables.

When the meat has been taken out and the jelly carefully strained and filtered, the jelly is put back into the kettle and the lid is put on again. A connection is made with a vacuum pump and the cooking kettle becomes a finishing kettle for extract.

Centrifugal Drier of Meats

This apparatus is based on the same principle as the centrifugal drying machines used in so many industries, laundries, etc. It is built like a cream-separator, but the bowl is perforated instead of being plain.

The meats which come from the sweet-pickle cellar are dumped into the bowl and it is put in motion; its speed is about 1,800 revolutions per minute. Under the influence of centrifugal force all the free liquids are expelled.

A great number of these machines are now in use in the southeastern countries of Europe, especially

where a great quantity of summer sausage is turned out. This affords, indeed, a quick means of freeing the meat of part of its constituent juices, a process which takes so long when drying is done by air circulation. Moreover, in the latter process the juices are lost; in the new one they can be saved for other purposes.

Not only the manufacturers of summer sausage, but also manufacturers of dried beef can derive advantage from the use of the centrifugal drier because it is during the first period of desiccation that there are the greatest risks of spoiling the products.

In the manufacture of canned meats proper it would seem that by treating the meats with the centrifugal machine one might, in certain cases, avoid the soaking process which is always detrimental to the natural flavor of the meat. By this treatment also a richer liquor for extract purposes may be immediately obtained.

Canning of Raw Meats

This is a favorite subject of mine and it involves a problem for which a solution has still to be found.

By stuffing the meat raw into the can the packer would do away with the 35% shrinkage which occurs during the boiling of the meat previous to canning, and the consuming public would get a better product, as they would obtain for a given price, not meat partially deprived of its savory principles and soluble extracts, by the boiling in water, but meat where all the nourishing principles have been concentrated in an air-tight receptacle and which would have even more nutritive value than the same amount of meat treated on the kitchen range. It is to be regretted that this problem has so far remained unsolved. Is it the fault of the

public or is it that of the packer? The question is difficult to answer.

It may be the fault of the public. They in fact do not know what they get for their money. They have been educated to a supply of solid, compressed, but washed-out meat; and they do not understand that they would get more by buying meats preserved in their concentrated cooking gravy.

Nevertheless I must blame the packer as being partly responsible for this state of affairs. While spending such considerable sums of money in advertising his goods, he might at the same time just as well have explained to the public what canned meats ought to be. It might even appear that the meat canner had some kind of interest in concealing the truth, but, if that was so, he is now caught in his own trap.

In attempting to supply the public with a "solid" piece of meat, he has to stand 35% shrinkage in cooking, and, if he is not so equipped as to be able to save the liquors and turn them into extracts, he sends to the drain these valuable liquors which are thus lost both to himself and to the consumer.

Things will have to change and the time will come when the public will ask for the brand that offers them the greatest amount of nutritive elements, agreeably seasoned, for the same money. And then the time of lixiviated, pressed, oversalted, overboiled meats will be over. The consumer will have to pay no more for his can of beef and he will not have to buy beef extract to season it—the identical extract made from the soluble principles of the very meat he has already purchased.

To conclude, the efforts of the intelligent canner should be directed to the canning of meat preserved with all its nutritive qualities. To give it the attractive

appearance which will satisfy the customer on opening the can is the problem to be solved.

It is to be sincerely hoped that the efforts of experimentalists (and I know a few of them) may meet with abundant success, as well in the interest of the canners as of that of the consuming public.

Legislation and Inspection

The necessity of protecting the public health against the ignorance, and sometimes the excessive cupidity, of a certain class of manufacturers of food products, has compelled the legislatures of all civilized nations to enact regulations concerning the preparation and the sale of food products, and, in consequence, meats, canned meats and all canned foods in general.

Whatever the manufacturer of canned foods may have thought when the law was first put in force, these regulations and the assurance thus given to the consuming public that they can buy and use canned meats with entire security, have been the most important measures in the interest of the canner himself.

A leading authority says, with reason: "If the people had implicit confidence in all manufactured food products, and all were strictly first class, the maximum capacity of all factories would be insufficient to supply the demand."

The large meat canners of the United States understood this side of the question at first glance and have been as eager to have the inspection of foreign prospective buyers as that of their own government. Thanks to the inspector's label they have succeeded in maintaining the confidence and continuing to book the orders of the great buyers of canned meats.

Inspection is, therefore, of vital importance to the manufacturer of canned foods

I may add that, in my opinion, the intelligent Government-inspector should be the friend of the packer, should explain to him fully the scientific reasons for his work, if necessary, and should, whenever possible, try to help him in the solution of the various problems of his trade as often as his scientific knowledge may be of assistance.

In all Government-inspected plants, the meats used in the manufacture of canned meats have been previously inspected and approved when fresh. The nature and quality of the preservatives which can be used being also well determined by the regulations, the main duty of the inspector in charge of the canning room would be to assure himself that all meats coming out of the pickling cellar are indisputably fit for human food.

Then the main point for him to watch would be that no reprocessing of leaks is done. As I have already explained, this is where there is actual danger for the public health on account of the possible formation of ptomaines, and of lead and tin salts which cannot be detected by the consumer, either by the advanced state of decomposition or by the swelled appearance of the can.

A few countries have also enacted regulations prescribing that all seams should be soldered outside, prohibiting the use of solder containing an excess of lead, and prohibiting also the use of chloride of zinc as a soldering flux. But these rules have not been adopted everywhere as yet as all hygienists are not agreed on the matter.

The balance of the regulations, which is common to all countries, concerns cleanliness in the operations, etc., prohibits a false description of the contents of the cans, of the net weight and of the date of manufacture.

APPENDIX

Spiced Salt or Prepared Salt

(For the Seasoning of Meats)

Spiced salt is prepared by thoroughly mixing 10 lbs. of fine salt to 10 oz. of especial spices for meats.

Special Spice for Meats

White pepper	1 lb.
Cayenne pepper	½ oz.
Curry	½ oz.
Ginger	3 oz.
Bay leaves	6 oz.
Thyme	6 oz.
Sage	6 oz.
Nutmeg	10 oz.
Cloves	3 oz.
Cinnamon	3 oz.

Plain Salt Solutions

Salt %	Water %	Degrees Salometer	Specific Gravity
0	100	0	1.
1	99	4	1.007
5	95	20	1.037
10	90	40	1.073
15	85	60	1.115
20	80	80	1.150
25	75	100	1.191

From the above table, it will be understood that the figure representing the percentage of salt in a solution is obtained by dividing the number of degrees by 4.

For instance, to make a 68 degree pickle, we have to dissolve 68 divided by 4, or 17 parts of salt in 83 parts of water.

Boiling Point of Solutions of Common Salt and Chloride of Calcium in Water

Common Salt %	Chloride of Calcium %	Boiling Point Thrm. Centigrade
7.7	10.	101
13.4	16.5	102
18.3	21.6	103
23.1	25.8	104
27.7	29.4	105
31.8	32.6	106
35.8	35.6	107
39.7	38.5	108
	41.3	110
	44.	111
	46.8	112
	49.7	113
	52.8	114
	55.6	115
	58.6	116
	61.6	117
	64.6	118
	67.6	119
	70.6	120
	73.6	

Tin-Plate Standards

Size	No. Sheets per Box	Net Weight of Box	Denomination
14 by 20	112	95	Light
14 by 20	112	100	ICL
14 by 20	112	107	IC
14 by 20	112	128	IXL
14 by 20	112	135	IX
14 by 20	112	156	IXX
14 by 20	112	176	IXXX

Comparison Between Steam Pressure and Steam Temperature

Pressure in lbs. per sq. inch	Temperature Fahr.
0	212
1	214
2	219
3	222
4	224.4
5	227
6	229
7	232
8	235
9	238
10	240
11	242
12	244
13	246
14	248
15	250

We are Designing and Consulting Engineers

for the Meat Packing and Canning Industries. We also manufacture and furnish all machinery and equipment for packing houses and canning factories. We solicit your correspondence, and will give same special attention.

Experts in Every Department

THE BRECHT COMPANY

Established 1853

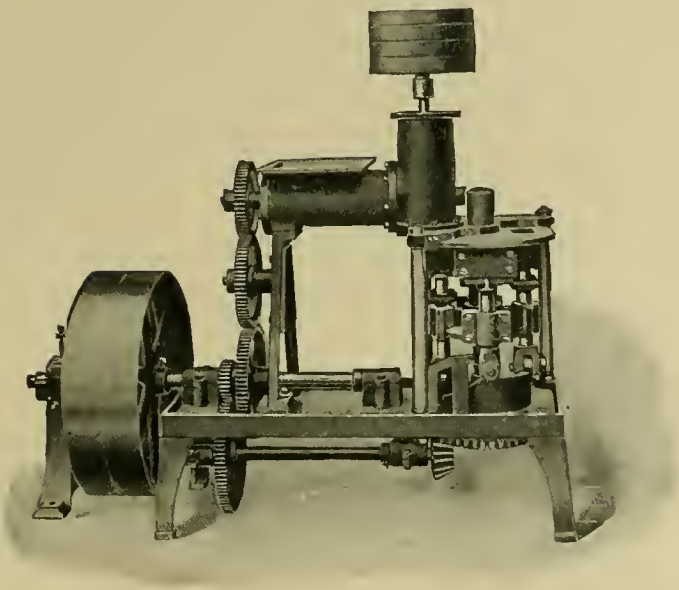
Main Offices and Factories: ST. LOUIS

Branches:

DENVER **NEW YORK** **SAN FRANCISCO**

BUENOS AIRES **HAMBURG**

Mince Meat Press



This machine has a capacity of 25 to 30 cakes per minute, and requires about 2 H. P. to operate it.

The moulds can be made to make any size cake up to one pound.

All the working parts that come in contact with the mince meat are made of bronze metal.

The gears are cut from solid metal.

It is provided with tight and loose pulley, 24 inches in diameter, four-inch face.

Should make about fifty revolutions per minute.

If it's a machine or apparatus used by the Canner of Meats, we can furnish it.

THE BRECHT COMPANY

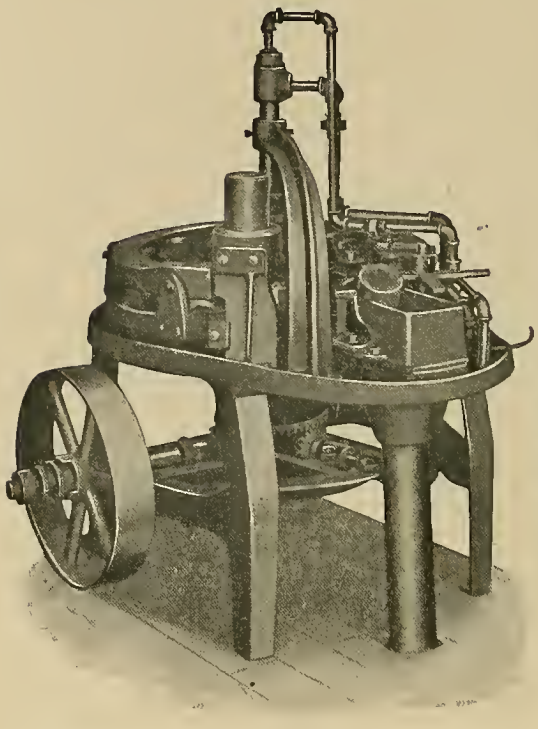
Established 1853

Main Offices and Factories: ST. LOUIS

Branches: DENVER NEW YORK SAN FRANCISCO

BUENOS AIRES HAMBURG

Can Washer and Sterilizer



This is an entirely automatic, compact little rotary machine, placed so as to intercept and treat the empty cans as they fall through the usual can chutes to filling machines. The cans are first subjected to a thorough washing by geyser spray of water under pressure, and then steamed in similar way and passed hot to the filler.

Capacity as desired, up to 5,000 cans per hour.

Four of the machines were used throughout the season of 1907 at the plant of the Gibson Canning Co., Gibson, Ill.—to which Company we can refer you.

The accumulating dross and dirt removed from apparently clean cans was something truly remarkable—(much of this was saved and is available as an exhibit)—to say nothing of the soluble matter removed in the operation.

All packers know of the unavoidable dust and particles of trash, etc., that find their way into empty cans, and the constant opportunities for unmentionable abuse to which they are subject during handling and storage, and must realize at once that this is one of the greatest aids to sanitary packing introduced in the movement for pure and sanitary canned goods.

Further Particulars and Price on Application

THE BRECHT COMPANY

Established 1853

Main Offices and Factories: ST. LOUIS

Branches: DENVER NEW YORK SAN FRANCISCO

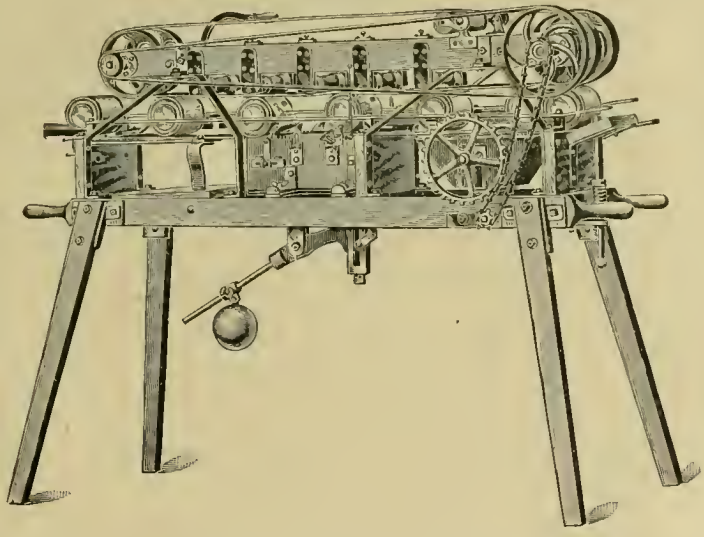
BUENOS AIRES HAMBURG

Universal Exhauster

View Showing Machine Uncovered

This machine will handle any size and any shape of can up to and including gallons without change, and can be furnished for any capacity desired.

Labeling Machine



This machine puts labels on tin cans in a perfectly satisfactory manner. Its thoroughly established reputation and exceptional merit are so well known as to make a detailed description of the machine unnecessary. This machine is not a luxury, but an absolute necessity in every well appointed canning factory.

Capacity, from 2,500 to 4,000 per hour. Floor space, 3x12 feet, including runways. Shipping weight, about 250 pounds.

THE BRECHT COMPANY

Established 1853

Main Offices and Factories: ST. LOUIS

Branches: DENVER NEW YORK SAN FRANCISCO

BUENOS AIRES HAMBURG

1
325794 A
2nd C.
2cd A
36

Our Main Offices and Factories, St. Louis

The above is a bird's-eye view of our great main plant in St. Louis, which covers almost an entire city block, and contains more than 600,000 feet of floor space.

This plant is equipped throughout with the most modern machinery, and devoted to the manufacture of machinery and appliances used in the meat industry and the working up of its by-products.

Our experts in every department are not only familiar with the mechanical part of the business, but also possess the technical knowledge necessary for the practical operation of packing houses, lard refineries and canning factories.

Correspondence solicited and given careful attention.

THE BRECHT COMPANY

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